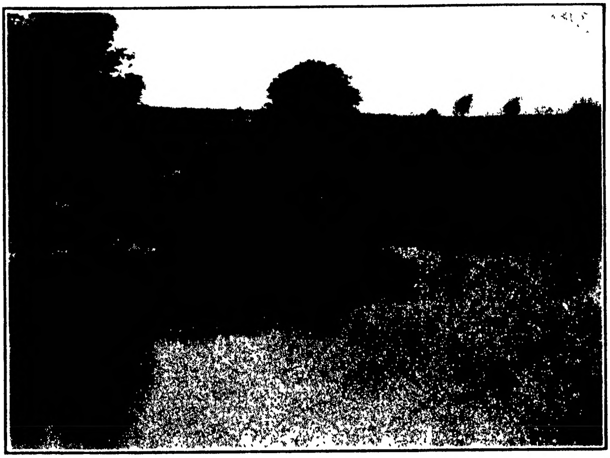

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ECOLOGY OF DRAGONFLY NYMPHS—LYON.

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AND

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CONTENTS:

The Ecology of the Dragonfly Nymphs of Cascadilla Creek (Odon.).

By MARY B. LYON.*

(Plate I.)

CONTENTS.

The work on which this paper is based includes observations on the nymphs of dragonflies occurring in a limited part of Cascadilla Creek near the Cornell University Campus. Representatives of most of the families of this group are found

*Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

there. The distribution of the nymphs in the stream bed and in the submerged vegetation has been studied, and is reported on in the following pages. The epiphytes and epizoa attached to the skin of the nymphs have been studied and are here listed for the first time. A whole population of epiphytes consisting of diatoms and other algae, and of epizoa, numbering some Protozoa and other microscopic forms, live habitually upon the backs of members of all families. Special attention has been given to food, which consists of almost any animal small enough for the nymph to hold. It varies, therefore, much in character and abundance according to the season. Chironomids and the young Odonate nymphs are always at hand; mayfly nymphs most of the time, and other forms only at certain seasons. Finally, some experiments to determine the protective value of water weeds as shelter for the nymphs are here recorded.

This study was suggested by Prof. James G. Needham, to whom it gives me sincere pleasure to express my gratitude for his kindly advice and criticism.

The Aquatic Situation.

Along the southern border of the Cornell University Campus, Cascadilla Creek flows swiftly over a bed of rocks and gravel, falls two or three feet over shelving rocks and then divides. One branch soon widens out into a broad sluggish basin and the narrow part of the stream dries up except during the spring and fall overflows. In the summer there is no noticeable current and the basin is then known as Cascadilla Pond. The other branch flows rapidly over a bed of pebbles and gravel for a short distance and then quiets down before joining with the first branch to form Dwyer's Pond.

The grassy meadow shut in by steep slopes on the north and west and traversed by these two branches of the creek, whose banks are partially shaded by trees, is an ideal home for the imagos; while the waters, swift or quiet, with beds of gravel and mud supply the diversity required by the nymphs. (Plate I, Fig. 1.)

I. Distribution of the Nymphs.

There are already on record some general observations on the habitat of dragonflies, as in Needham and Hart, '01, and on their distribution in relation to the velocity of water (Needham, '02). In this paper some further ecological notes are added and the distribution of 30 species, comprising the odonate population of the small area just described, is recorded.

Rapid water forms are few. The damsel-fly, *Argia putrida*, is found under the stones in the swift water above the branching of the creek, and the dragonfly, *Cordulegaster diastatops*, in the nearby gravel. The latter, covered with sand and with the eyes and caudal respiratory opening arched to the surface, lie quietly waiting for their prey to come within reach of their labia. They are provided with two strong claws on each leg with which they are able to crawl over the bottom. The flat, sprawling *Ophiogomphus* lies in the gravel a little farther down stream, where the water flows less rapidly. Everywhere at the edges of the current the damsel fly, *Calopteryx maculata*, climbs awkwardly about the weeds and roots, usually bearing aloft the three caudal gill plates. In this position they can perhaps see their prey more readily as it moves by or is swept past by the current. *Hetaerina americana* is also found on the weeds in rapid water, the imago appearing in the field August 6th for the first time.

Quiet water forms are more numerous. Large numbers of *Gomphus descriptus*, *G. spicatus*, *G. villosipes* and *G. sordidus* burrow in the soft mud of the sluggish part of the stream and especially near the head of the pond. A net swept through the debris along the edge of the pond will occasionally catch what seems at first a very dark, almost black leaf, but which on closer examination proves to be the thinnest, broadest and most grotesque of all the nymphs, *Hagenius brevistylus*. Besides these there are little short "masked" Libellulids which lie half buried in the mud or crawl about over the bottom of the pond or on the *Elodea* or other water weeds close to it. *Libellula pulchella*, *Leucorhinia intacta*, *Plathemis lydia* and *Pachydiplax longipennis* are all represented in this group.

The Aeshnines and Agrionines climb about on the weeds in the pond or occasionally at the edges of the stream. Of the Aeshnines *Basiaeschna janata, Aeshna constricta* and *Anax junius* are fairly common. Among the Agrionines, *Argia violacea* is common, while *Chromagrion conditum* and *Amphiagrion saucium* are more rare. *Lestes rectangularis* is quite rare. *Ischnura verticalis* is exceedingly common and *Nehalennia irene* equal in numbers to the more abundant species of *Enallagma,* which is represented by *E. antennatum, E. divagans, E. doubledayi, E. ebrium, E. exsulans, E hageni* and *E. signatum.*

There is evidently a seasonal change in the location of the nymphs, at least of those of damsel flies. In the fall, Anisoptera and Zygoptera were abundant in the masses of weeds in midstream, but there were none to be obtained there in the springtime when they were numerous along the edges. During the summer these forms oviposited mostly upon the weeds or algal mats out in the stream. It is evident from this that the eggs hatch and the nymphs remain in the stream until the fall rains make the current too strong, whereupon they move into the edges of the current and then downstream.

II. Epiphytes and Epizoa.

The census of the population which settles upon the backs of odonate nymphs forms an interesting record. Twenty-six nymphs varying in size from 15 to 36 mm. were taken from Cascadilla Pond between April 24 and June 20. They were scraped with a tiny scalpel, the scrapings mounted in water on a slide and studied under the microscope. Diatoms, green and blue-green algae and a variety of protozoa and other microscopic invertebrates were found. (See page 5.)

Diatoms.—Besides the 19 species of diatoms recorded, there were several species of *Navicula* and *Synedra* which were not identified. These two groups were present almost constantly and in abundance, while *Gomphonema* on its long stalks and *Encyonema* in its gelatinous ribbon were frequently present and often exceedingly abundant, *Nitzschia sigmoidea* was very

			EPIPHYTES — DIATOMS															CHLOROPHYCEAE									CYANOPHYCEAE				EPIZOA								
No.	Date	Nymph	Melosira	Stephanodiscus	Navicula	Encyonema	Amphora	Gomphonema	Tabellaria	Fragillaria	Diatoma	Synedra	Pleurosigma	Nitzschia	Surirella	Cymatopleura	Cocconeis	Oedogonium	Ulothrix	Microspora	Zygnema	Mougeotia	Spirogyra	Desmid	Chaetosphaeridium	Scenedesmus	Oscillatoria	Phormidium	Merismopedia	Beggiatoa	Rhizopoda	Ciliata	Flagellata	Suctoria	Rotatoria	Nematoda	Oligochaeta	Crustacea	
1	4-24	AESHNINAE																																					
2	"	Basiaeschna janata			x	x		x				x						x		x							x			x									1
3	"	" "			x	x		x				x				x		x		x	x						x			x		2							2
4	"	" "			x	x		x				x						x		x							x			x									3
5	5-8	" "			xv	x		x			x	x		s			x	x	x	x	x	x		c 1		x	x			x		1	2		2	1	1		4
6	5-10	Anax junius			x									s				x									x												5
7	"	"			x			x		x																													6
8	5-16	Aeshna			v	x	x					u		s			x	x									x								1				7
9	6-16	"	x		x	x	x	x	x			xu		s	x		x	xc	x			x					x			x	1	1	3		1				8
		"			x	x		x	x			xu		s			x	x	x			x			x							2							9
10	5-8	GOMPHINAE																																					
11	6-9	Gomphus			x	x				x		u		s	x			x									x			x				1					10
12	"	"	x		x	x	x											x			x			c 1															11
13	6-17	"			xm	x		x	x	x		u					x	x				x					x						1			1			12
		"			x	x						x	x																	x									13
14	5-8	LIBELLULINAE																																					
15	6-25	Plathemis lydia			v			x						s				x									x			x			1	1					14
16	5-9	" "			x	x																	x				x					2		1					15
17	7-10	Pachydiplax longipennis			x			x		x				s				x	x													1							16
18	5-10	" "			xv	x		x		x		x c u		s			x	x	x				x	c o			x		x	x	1	2		1	1				17
19	"	Leucorhinia intacta			v									s		x											x			x					1				18
20	5-16	" "			x			x					x	s				x									x			x		1		2					19
21	5-26	" "			xm							x	x	s								x					x	x		x		1	1	1					20
22	6-17	" "			xv		x	x				u	x	s	x	x		x				x		c 1			x			x		1		1	1				21
		" "		x	x	x						xu	x	s		x		x	x							x	x			x		1			1			1	22
23	5-8	AGRIONIDAE																																					
24	"	Calopteryx maculata			x	x		x				x							x																				23
25	6-9	" "			x	x		x		x		u		a				x									x												24
26	6-20	Enallagma antennatum			x	x		x				c					x	x				x																	25
		" sp.			,										x			x	x													3							26
		Total	2	1	x=22 v=6 m=2	17	4	16	3	6	1	x=11 u=9 c=2	5	s=14 a=1	4	4	7	x20 c 1	8	4	3	7	2	cl 3 co 1	1	2	18	1	1	14	2	18	8	8	8	2	1	1	

Navicula—x small species unidentified.
v Navicula viridis.
m Navicula major.

Synedra—x unidentified species.
u Synedra ulna.
c colonies of Synedra.

Nitzschia—s Nitzschia sigmoidea.
a Nitzschia acicularis.

Oedogonium—c Oedogonium ciliatum.

abundant but was not found at all upon damsel-fly nymphs. With this exception the more common forms seemed to be generally distributed among the families, regardless of the difference in the habitat of the nymphs.

OTHER ALGAE.—*Oedogonium, Oscillatoria* and *Beggiatoa* were common; other forms appearing occasionally in scattered filaments. The nymphs which climb about just above the bottom made an ideal dwelling place for *Beggiatoa*.

RHIZOPODA.—Rhizopoda are represented by *Amoeba lobosa* and *Difflugia*.

CILIATA.—Because of the greater number of sessile forms the ciliates were far more numerous than any other group of animals. *Epistylus plicatilis, E. nympharum* and *Vorticella* became exceedingly abundant as the season advanced. Late in June some Enallagmas were almost completely covered with them, even the antennae bearing great white clusters. *Vaginicola* and *Cothurnia* are also sessile forms. *Paramoecium* and *Euplotes* appeared a few times.

FLAGELLATA.—*Euglena viridis* and *Euglena deses, Phacus pleuronectes, Anisonema acinus* and *Peranema tricophorus* compose the list of flagellates.

SUCTORIA.—The Suctorians, *Podophyra quadripartita* and *Acineta tuberosa* were found only on Gomphines and Libellulids, but on these in great abundance.

ROTIFERA included *Floscularia, Notholca, Monura, Philodina.*

Chaetonotus and two undetermined rotifera, *Anguillula,* an oligochaete worm and an ostracod complete the list of animals found in this population.

The Zygoptera and some of the Aeshnines, especially *Anax junius,* which climb about more actively upon the weeds near the surface of the water, have the smallest number of plants and animals upon them. The Gomphines, which burrow beneath the bottom, have relatively few as compared with the other nymphs which climb about on the weeds near the bottom or crawl over the mud. No parasites were found, but one Libellulid nymph was observed on which a Chironomid larva

had built its case and was feasting on the diatoms about the door of its house. This incident seems to express, perhaps in exaggerated form, the one-sided benefit resulting from the relationship between epiphytes, epizoa and the nymphs. Kammerer ('08), who maintained that the algal growth may bring to the nymph such benefits as a richer supply of oxygen, the keeping aloof of parasites, protection through color, *et cetera,* thinks this relationship is one of symbiosis. The relation seems to me to be a natural one resulting from proximity; because, if the populations living upon the nymphs be compared with those of the mud and water weeds which the nymphs inhabit, they will be found practically the same. The abundance of the population in both cases depends to some extent upon the inactivity of the nymphs.

III. The Food of the Nymphs.

From November 14 to July 10, dragonfly and damsel-fly nymphs were taken from Cascadilla Pond directly to the laboratory, where the contents of their stomachs were mounted in water upon slides and examined under the microscope. If they could not be examined immediately, the heads of the nymphs were removed from the bodies and the alimentary canal gently pulled out, but not severed, so that the contents could be preserved in formalin, and the head and body remain connected for later identification. Eight nymphs contained no fragments of food, but four of these had eaten much sand. The presence of large quantities of diatoms* was puzzling until it was noticed that they appeared during the cold months when Chironomid larvae are the chief source of food, and, in one or two cases, they were seen to be protruding from partially digested larvae. The cases of the Chironomids, on which diatoms grow abundantly, may account for some of the shells and probably the sand present was that of Chironomid cases from which the larvae had been entirely digested. Bits of

*Dr. A. H. Morgan has suggested that some of the diatoms are undoubtedly taken in with the mayflies since they are abundant in the food and epiphytes of mayfly nymphs.

algae were found frequently, but were supposedly taken in by accident. The eggs recorded were thought to be those of a dragonfly.

The large majority of animals eaten were insects, the total number being 95. Five orders were represented, the numbers in each being Ephemerida 8, Hemiptera 11, Diptera 62, Coleoptera 1, Odonata 13. The closely allied groups of Crustacea (13) and Hydrachnida (4) with one snail in addition completed the list. (See page 9.)

EPHEMERIDA.—Four Heptagenias were eaten by four nymphs, *Basiaeschna, Sympetrum, Plathemis* and *Calopteryx*, representing three families of quite different habits. *Hexagenia* was eaten by *Anax junius, Caenis* by *Plathemis*, and two mayflies eaten by *Basiaeschna* and *Calopteryx* were not well enough preserved to be identified.

HEMIPTERA.—This group is represented by the nymph of the waterbug *Corisa*, found the last of April, three of which were eaten by *Leucorhinia intacta*, and one each by *Plathemis, Basiaeschna* and *Calopteryx*, again showing a similar diet in three different families. Two adult waterboatmen were eaten, one each by *Sympetrum* and *Gomphus sordidus* respectively in March.

DIPTERA.—The number of Chironomid larvae far exceeded that of any other animal or group. They constitute the "staff of life" for the nymphs because they are at all seasons abundant and available.* They were eaten by all of the species examined except *Pachydiplax*, which was probably an accidental omission. *Sympetrum*, taken on November 30 with a mayfly and a damsel fly besides 22 Chironomids, most of which were in almost perfect condition, is an example of the appetite and capacity of one of the smaller nymphs. Size seems to have made little difference in the choice of food.

The following species of Chironomids were identified in the food: 1 *Chironomus tenellus* Zetterstedt, 1 *Ch. flavus* Johannsen, 1 *Ch. modestus* Say, 4 *Tanytarsus dissimilis* Johannsen,

*This is especially true in the Winter, when mayflies and the young of their own kind seem to be the only alternatives.

TABLE SHOWING THE CONTENTS OF THE VENTRICULUS OF 36 NYMPHS.

No.	Nymph	Ephemerida	Hemiptera Nymph	Hemiptera Adult	Diptera Chironomids	Diptera Other larvae	Coleoptera	Odonata	Crustacea	Hydrachnida	Snails	Miscellaneous	Date	Size
1	AESHNINAE—Basiaeschna janata	1			1			1				Diatoms, Closterium, Scenedesmus caudatus	11-14	....
2	"	1										Diatoms	11-21	Small
3	"		1		1			1					6-18	22 mm.
4	Aeshna				5								6 16	24 mm.
5	Anax junius				5				1			Sand	8-13	....
6	"				1								"	Small
7	"				1			2	2				4-30	28 mm.
8	"	1			1		1	1			1	Sand, Closterium, Oedogonium	6-9	37 mm.
9	GOMPHINAE—Gomphus							1				Diatoms.	11-30	....
10	"				1								8-13	Abd. 15 mm.
11	" sordidus			1	2								"	" 7 mm.
12	" "				1			1	1			Sand	4-30	28 mm.
13	LIBELLULIDAE—Leucorhinia intacta											Sand, many spines	3-13	....
14	"											Sand	"	....
15	"											Sand	"	....
16	"		1		2			1	3				6-17	15 mm.
17	"		1		2	2			1				6-18	12 mm.
18	"		1					1				5 eggs	7-10	15 mm.
19	Sympetrum	1			22			1					11-30	....
20	"			1	1				2	1		Sand	3-13	....
21	"				3								"	....
22	Plathemis lydia		1		1			2	1	1			4-30	16 mm.
23	"	2											"	"
24	Pachydiplax longipennis						1	1					7-10	25 mm.
25	AGRIONIDAE—Calopteryx maculata	1										Diatoms, Closterium	11-21	....
26	"				2							Diatoms	"	Small
27	"	1			2				2	2			4-30	32 mm.
28	"				1								"	20 mm.
29	"		1										"	30 mm.
30	Chromagrion conditum				1								"	18 mm.
31	Enallagma sp. ?				1								6-16	....
32	" signatum				1								"	18 mm.
33	" "				1								6-18	"
34	" antennatum								1				6-16	20 mm.
35	" "				3								"	"
	Total	8	6 (8)	2	62 (64)	2	2	13	14	4	1		11-14 to 7-10	12 to 37 mm.

2 *T. dives* Johannsen, 1 *Cricotopus trifasciatus* Panzer, 1 *Ch. fulviventris* Johannsen, 5 *Ch. riparius* Meigen, 1 *Ch.* sp. 81 Johannsen, 1 *Ch.* sp. 83 Johannsen, 1 *Orthocladius fugax* Johannsen.

Nine belong to the genus *Chironomus*, three to *Tanytarsus* and one to *Orthocladius*. The genus of the remaining number could not be determined.

The only other Diptera were one mosquito larva (*Anopheles maculipennis*) and one unnamed larva.

COLEOPTERA were represented only by two Dytiscid beetles and these eaten in the summer months, June and July.

ODONATA.—A damsel-fly is a delectable bit for a dragonfly and two nymphs of the same size in either group cannot safely be left together unless they are about to transform, when they do not eat. All of those recorded were damsel-flies except one Libellulid and one *Ophiogomphus*. The only damsel-fly which could be determined was *Enallagma hageni*.

CRUSTACEA.—From the middle of March onward, Crustacea are an important item in the food of all families of dragonflies. Considering the abundance of Amphipods in Cascadilla Pond, it is surprising that they are not even more generally used than the records indicate. In the collections made, Amphipoda are represented by five *Hyalella;* Cladocera by two *Diaptomus* and four *Cyclops;* Ostracoda by two *Cypris* and one specimen whose genus was not determined.

HYDRACHNIDA.—*Plathemis* and *Sympetrum* had each eaten the almost uninjured larva of a mite, and *Calopteryx* had devoured two water bears (*Macrobiotus*), which had remained in almost perfect condition.

A *Physa* had been recently eaten by an *Anax* and had remained only partly digested.

From this detailed study it is evident that the nymphs of Odonata are strictly carnivorous, all families feeding voraciously throughout the year upon Chironomid larvae, mayflies and the young of their own order. In the warmer months they eat Crustacea and Hemiptera, at which time these are available, not refusing any other forms which chance to pass within reach of their powerful labium.

IV. Experiments to Determine the Efficiency of Shelter as Protection against Enemies.

Since it is well known that Odonate nymphs have enemies such as fishes, waterbugs and larger nymphs of their own kind, and, since most of them seek shelter in the mud, sand or weeds, the question of the effectiveness of this shelter is a vital one. Vegetation is the universal source of shelter. In the submerged meadows about Ithaca *Elodea, Myriophyllum* and *Potamogeton* are among the typical water weeds, and these were selected for the experiments.

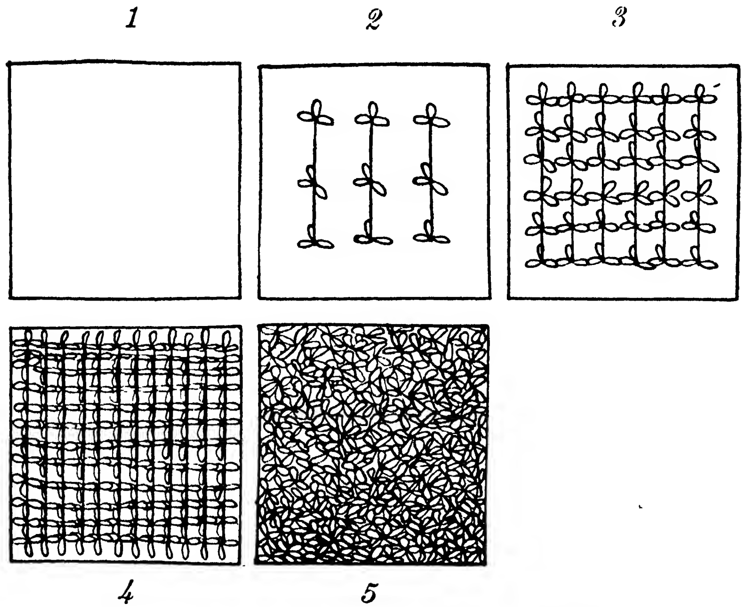
Apparatus (Plate I, Fig. 2).—In order to control the animals in as natural a habitat as possible, a small part of Cascadilla Pond was fenced off with barbed wire, and a bridge of logs and planks built to render this little "pasture" easy of access. Within the enclosure a rough table and stool were set up so that work might be conveniently carried on.

Five cages were marked and placed in the pond with a space between each two equal to the width of a cage. Each one had a zinc bottom ten inches square upon which was soldered a band of galvanized wire gauze, which formed the sides eleven inches in height. The top was left uncovered. Each cage was submerged to a depth of nine inches, thus allowing the sides to project five inches above the water, which was sufficient to prevent the animals within the cage from getting out and those in the pond outside from getting in. Some very small Chironomids, Amphipods, *et cetera*, could get through the wire, but these did not affect the results.

In the first set of experiments the common water weed, *Elodea,* provided shelter. The plants were washed thoroughly and then carefully examined by placing them in water in a white porcelain tray to make sure that no damsel-flies or other animals were in hiding.

Cage 1 was left empty. Three twisted wire bars were placed horizontally and at equal distances from each other in cage 2. To each one of these, three plants were tied, the distance between them being made equal to the expanse of the leaves of the plant. The bars acted as weights, thus holding the

plants in their natural position. Cage 3 contained six bars to each of which six plants were tied with the leaves of adjacent plants in contact. Cage 4 contained twelve bars each with



Diagrams showing Distribution of Vegetation in Cages 1-5.

twelve plants, with one of the whorl of three leaves overlapping that of the next plant. Cage 5 was packed with plants so that no bars were necessary.

In order to make a quantitative measure of the material which afforded the shelter, both plants and wire bars were placed in a graduate partly filled with water. The rise of the water was then noted and the records are given below.

Cage 2, containing 3 bars with 3 plants each, displaced 50 cc. water.

Cage 3, containing 6 bars with 6 plants each, displaced 135 cc. water.

Cage 4, containing 12 bars with 12 plants each, displaced 355 cc. water.

Cage 5, packed with plants, displaced 915 cc. water.

The damsel flies used were *Enallagma* and *Ischnura,* individuals of equal size being selected. Six were placed in each cage with some enemy, such as *Anax* or a Dytiscid larva. The six enemies in the several cages were of nearly equal size. At the end of 36 hours the weeds were examined in a white porcelain tray. The results of the series are given in the following table.

THE EFFICIENCY OF SHELTER

Experiment	Shelter Plant	Enemies	Nymphs Under Observation: No. in each cage at start	No. at time of record, 36 hours later in Cage No. 1	2	8	4	5	Remarks
A^1	Elodea	1 Anax junius..	6	0	2	2	2(1)	5	(1) 1 transformed.
A^3	"	1 "	6	0	3	3	1	5	
A^2	"	1 "	6	1	1	4	5	4(1)	
B	"	1 Dytiscid larva	6	3(2)	3	4(1)	1(2)	2(1)	
C	"	Horned dace..	6	0	0	2	2(1)	4	Fish 2½ inch. long, about 1 yr. old.
A	Myriophyllum......	1 Anax junius..	6	0	0	4(1)	5	2	Anax in cage 8 died.
B^1	"	1 Dytiscid larva	6	5	5	5	4	5	
B^2	"	1 "	6	4	1	4	5	1	
C	"	Horned dace..	6	0	0	2	2	6	
A	Potamogeton crispus	1 Anax junius..	6	2	5	2	2(1)	8	
B^1	" "	1 Dytiscid larva	6	4	4	2(2)	3(1)	6	
B^2	" "	1 "	6	5	5(1)	6	6	4	
C	" "	Horned dace..	6	3	1	2(1)	2(1)	2(1)	

The same method of placing the shelter was followed throughout the series. In the second set of experiments *Myriophyllum* was used because its needle-like leaves offered a different kind of shelter from that of *Elodea.* The arrangement was as follows:

Cage 2, containing 3 bars with 3 plants each, displaced 80 cc. water.

Cage 3, containing 4 bars with 4 plants each, displaced 170 cc. water.

Cage 4, containing 7 bars with 7 plants each, displaced 375 cc. water.

Cage 5, packed, displaced 845 cc. water.

For the third set of experiments, *Potamogeton crispus,* a fairly large plant, with long, broad leaves, was chosen.

Cage 2, containing 2 bars with 2 plants each, displaced 30 cc. water.

Cage 3, containing 3 bars with 3 plants each, displaced 60 cc. water.

Cage 4, containing 5 bars with 5 plants each, displaced 150 cc. water.

Cage 5, packed, displaced 475 cc. water.

From the various combinations of shelter and enemies in the experiments recorded here, the following results were obtained:

1. Dense growths of water weeds but ineffectively protect damsel-fly nymphs from dragonflies. The results were irregular, the shelter at one time efficient, at another inefficient. This might be expected from their similarity in habitat and the custom of the dragonflies to catch their prey as they climb slowly over the weeds.

2. Vegetation of varying density provided a more effective shelter from Dytiscid larvae. There were cases in which the degree of shelter had no influence. Dytiscid larvae are more likely to seek prey at the surface or on the bottom than in midwater. This accounts for irregularities of results here, since even in the empty cage the damsel flies would climb about on the sides of the cage.

3. In every case except cage 2, where the vegetation was very scanty, it was a shelter against fish, the shelter becoming more efficient with increased density. Fish are undoubtedly among the worst enemies of damsel-flies; examination of the contents of fishes' stomachs has repeatedly shown this. The protection afforded by dense aquatic vegetation has then an enormous effect on the economy of the life of damsel-flies.

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EXPLANATION OF PLATE I.

Fig. 1. A view of Cascadilla Creek. Collecting grounds in the foreground. Photo by Anna H. Morgan.

Fig. 2. Cascadilla Pond enclosure with nets and cages used in experiments. The weeds and algal mats characteristic of the pond are shown in the foreground.

Fig. 3. Median gill plate of nymph of *Enallagma ebrium* Hagen.

A New Pieris from Cuba (Lepidoptera).

By CHARLES T. RAMSDEN, Guantanamo, Cuba.

Pieris menciae n. sp.

Male: Expanse (one wing) 32 mm. Female: Expanse (one wing) 29.5 mm.

♂. Primaries white, with the faintest tinge of yellowish glaucous (Ridgway). The outer half of the costal edge and the upper half of the outer margin, faintly edged with black. The central veins of the primaries are overlaid with chalk-white scales, in the form of streaks or bands 2.5 mm. wide; they do not reach the outer margin.

Secondaries of the same color as the primaries, with the chalky-white scales confined mostly to the disk.

Underside. Primaries as above, except that the costal edge and the tips of the wings are ivory-yellow or massicot-yellow (Ridgway). Secondaries immaculate and massicot-yellow.

Thorax and abdomen white; the legs the color of the underside of the secondaries. Antennæ black above with the extreme of the club sulphur-yellow.

♀. Like the male except that it is a few shades darker in color and lacks the chalky scales of the male, these being a secondary sexual character.

Male type and allotype in the collection of the Academy of Natural Sciences of Philadelphia. Paratypes in the collection of the author. Specimens were taken June 10 and 26, 1914.

Habitat.—West and southwest of Guantanamo, Cuba.

The species was not uncommon about Guantanamo City and it seems strange that Gundlach, who worked this district over very critically, did not find it. I have never seen it in the higher altitudes. I have taken it from April 14 (earliest) to September 18 (latest record), but it is most abundant during late summer. I have dedicated this species to my wife, who has accompanied me in my collecting trips. I compared this species at the British Museum, through the kindness of Messrs. Richard South and N. D. Riley, where I found something very close to it from Venezuela, which was still unnamed. If this should happen to be the Venezuelan form, it could be accounted for as having been brought over in the chrysalis; it might have emerged while the ship was unloading in port, and finding congenial surroundings and food plant, the species established itself firmly about Guantanamo. This could have happened at the end of the Spanish-American war, when many ship-loads of cattle were brought from Venezuela and Colombia to Guantanamo, and this may also account for the fact that Gundlach did not see the species.

The Cimex on American Bats (Hemip., Heter.).

In reference to Mr. John T. Zimmer's remarks in ENTOMOLOGICAL NEWS for November last, page 418, his note reveals what I have suspected—that according to the then state of our knowledge, a certain bug on a bat was determined as *Cimex pipistrelli* Jen. Horvath (Ann. Mus. Nat. Hung. X, pp. 257-262) cites the species found on American bats, which he had described in *Ent. Mo. Mag.* (2) XXI: 12, fig., in 1910, under the name *Cimex pilosellus,* giving *Vesperugo noctivagus* as one of the hosts. This is in all likelihood the species Mr. Zimmer has reference to.

I shall later refer to the other forms mentioned in my previous note.—J. R. DE LA TORRE BUENO.

Descriptions of three new species of the Dipterous genus Sciapus with a key to the North American species.

By M. C. Van Duzee, Buffalo, New York.

In working out the following table of species, I have used Prof. J. M. Aldrich's key, published September, 1904, in the Transactions of the American Entomological Society, as a basis, but uniting under *Sciapus* the genera *Psilopdinus* and *Agonosoma* there used, as is done by most of the European authors now. This key places eighteen species not contained in that of Prof. Aldrich. Four of these were described by Mr. Coquillett, five by Mr. Bigot and nine by myself. Of these last, three are described in this paper, as follows: *noveboracensis, banksii,* and *bradleii;* three in the Canadian Entomologist, *chalybeus, digitatus,* and *nigrimanus:* and three, *furcatus, leonardi,* and *pollinosus,* will be more fully described in my report of the Dolichopodidae of Okefenoke Swamp, Georgia.

Five species in this key described by Mr. Bigot seem to be recognizable; at least they seem to be distinct from all other known species from North America, but his *carolinensis* and *pallescens* I could not do anything with. Mr. Bigot does not mention any hairs on the face of his *occidentalis, pampoecilus* and *hirtulus,* so I take it that they have the face bare, as no doubt they have; he also states that *occidentalis* has the arista long, so I place it in the section where the arista is at least two-thirds as long as the body; the long bristles of the thorax and abdomen would indicate that it belonged there. He states that the femora of *hirtulus* are reddish with violet reflections; therefore, I take it that his specimen was somewhat immature and the femora should be blackish with violet or green reflections, as this is sometimes the case with immature specimens with dark femora. For the same reason I have placed his *occidentalis* in the group with blackish femora; he describes them as reddish brown.

Key to the North American Species of Sciapus.

1 Cilia of the tegulæ black or dark brown 2
Cilia of the tegulæ pale 67

2 Femora black, the tips may be yellow 3
Femora yellow or mostly yellow 54
3 Wings with dark markings 4
Wings without dark markings 35
4 Dark markings on the wings consist of two cross-bands connected along the costa, in some immature specimens reduced to an infuscation of the veins 9
Dark markings otherwise 5
5 Wings black except beyond the forking of the fourth vein and the hind margin. (Ariz., Mex., W. I., S. Am.)..*dimidiatus* Loew
Wings mostly hyaline 6
6 Wings with an ill-defined brownish band extending from the costa to the posterior end of the cross-vein. (Mex.)...*infumatus* Ald.
Wings with a cloud along the anterior portion 7
7 Middle tibiæ with rather large bristles on the front surface 8
Middle tibiæ destitute of bristles. (Mex.) ....*ciliipennis* Ald.
8 Middle tibiæ with three long, slender bristles, hind tibiæ without bristles. (Pa.) ....*chalybeus* V. D.
Middle tibiæ with a row of about fourteen bristles, hind tibiæ with a similar row. (Mex., Cent. Am.) ....*cilipes* Ald.
9 Fore tarsi with dense black fringe on the sides of the fourth and fifth joints, middle tarsi with the second and third joints less broadly fringed. (Mex.) ....*bifimbriatus* Ald.
Fore tarsi of different structure 10
10 Fore tibiæ black 11
Fore tibiæ pale, at utmost brownish 14
11 Second antennal joint with many and long bristles 12
Second antennal joint with few and short bristles. (Mex.) *praestans* Ald.
12 Last four joints of fore tarsi subequal 13
These joints of gradually decreasing length. (West U. S., Mex.) *melampus* Loew
13 Face with numerous delicate, pale hairs. (U. S.)..*patibulatus* Say
Face bare. (West U. S.) ....*pilicornis* Ald.
14 Fore tarsi yellow, not or but little infuscated towards the tips..15
Fore tarsi infuscated, part of the first joint may be yellow 17
15 Abdomen with two long, wavy, hair-like bristles on the sides at tip. (Mex., Guatemala.) ....*forcipatus* Ald.
Abdomen without such bristles 16
16 Middle tarsi black, fourth and fifth joints with narrow silvery fringe above. (Mex., Brazil.) ....*diffusus* Wied.
Middle tarsi but little infuscated and with the fourth joint pure white. (W. I., Mex., Brazil.) ....*bellulus* Ald.

17 Knob of the halteres infuscated 18
Knob of the halteres yellow 23
18 Middle and hind tibiæ entirely black 19
At least the middle tibiæ largely yellow 20
19 Middle metatarsi ciliated above. (Cuba.) ....*pilosus* Loew
Middle metatarsi not ciliated. (Mex.) ....*inornatus* Ald.
20 Last four joints of hind tarsi regularly decreasing in length. (W. I., Brazil.) ....*jucundus* Loew
These joints not regularly decreasing, the last two or three being subequal 21
21 Last two joints of hind tarsi subequal and a little swollen. (Mex.) *atricauda* Ald.
Last three joints subequal and a little flattened 22
22 Last three joints of hind tarsi glabrous, middle metatarsi as long as their tibiæ. (Mex., Brazil.) ....*triseriatus* Ald.
Last three joints of hind tarsi hairy, middle metatarsi longer than their tibiæ. (Ga.) ....*leonardi* V. D.
23 Apical third of fore coxæ with trochanters and base of femora yellow. (Mex.) ....*coxalis* Ald.
Not more than the extreme apex of fore coxæ yellow 24
24 Third antennal joint large............................25
Third antennal joint small or of moderate size................26
25 Second antennal joint with long bristles. (Mex.) .*astequinus* Bigot
Second antennal joint with short bristles. (Mex) .*purpuratus* Ald.
26 Second antennal joint with short bristles......................27
Second antennal joint with long bristles 30
27 Middle tibiæ with a row of bristles on the lower front surface extending the whole length 28
Middle tibiæ with not over four bristles at most in the same longitudinal line 29
28 Fore metatarsi with a row of erect bristles below, second joint without bristles. (Guatemala.) ....*nigrimanus* V. D.
Fore metatarsi with a few bristles near tip, second joint with a row of small bristles below. (Mex.) ....*genualis* Ald.
29 Bristles on the second joint of the antennæ shorter than the diameter of that segment. (Mex.) ....*breviseta* Coq.
Bristles on second joint about as long as the antennæ. (Cuba.) *digitatus* V. D.
30 Middle tibiæ with a row of stout bristles on the outer side, middle metatarsi ciliated. (Mex., Brazil.) ....*triseriatus* Ald.
Middle tibiæ with not over four bristles in a row, middle metatarsi not ciliated 31
31 Last two joints of hind tarsi flattened 32
Last joints of hind tarsi not flattened 33

32 Hind tibiæ bearing a single bristle. (Mex.) ....*longiseta* Coq.
Hind tibiæ with scattered bristles. (Mex.) ....*depressus* Ald.
33 Hypopygium and its appendages very small, the latter finger-like. (Mex.) ....*similis* Ald.
Hypopygium and its appendages large 34
34 Hypopygial lamellæ large, flat, with an excavation at tip and short, curling, dark hair on the inner surfaces. (Mex.) *atrolamellatus* Ald.
Lamellæ broad, nude, each composed of two flattened plates, the outer attached to the inner near the base. (Mex.)..*clunalis* Coq.
35 Face with abundant slender hairs 36
Face bare 41
36 Face with dark hairs. (Mex.) ....*barbatus* Ald.
Face with pale hairs 37
37 Middle metatarsi with a row of crooked bristles below 38
Middle metatarsi normal 39
38 Tip of abdomen with a tuft of long hairs, the longest being nearly as long as the last four segments of the abdomen. (U. S., W. I., Mex., S. Am.) ....*caudatus* Wied.
Longest hairs at the tip of the abdomen not much longer than the last segment. (U. S.) ....*scobinator* Loew
39 Middle tibiæ with a strikingly long apical spur. (U. S.) *calcaratus* Loew
Spur of middle tibiæ rather short 40
40 Last four joints of fore tarsi of regularly decreasing length. (U. S.) ....*inermis* Loew
Last four joints of fore tarsi short, second and third subequal, fourth as long as the two preceding. (U. S.) ...*patibulatus* Say
41 Arista at least two-thirds as long as the entire body 42
Arista much shorter 45
42 Fore metatarsi with long cilia above 44
Fore metatarsi without long cilia 43
43 Arista ending in a small disk. (Mex.) ....*nobilissimus* Ald.
Arista plain. (Calif.) ....*occidentalis* Bigot
44 Hypopygial appendages pale, middle metatarsi ciliated. (U. S.) *comatus* Loew
Hypopygial appendages blackish, middle metatarsi plain. (U. S.) *crinitus* Ald.
45 Thoracic dorsum covered with thin white pollen, front densely silvery pollinose 46
Thorax and front mostly shining 47
46 Legs wholly black, fore tibiæ with three or four bristles in a row. (Mex.) ....*argentatus* Ald.
Fore and middle femora and base of fore tarsi yellow, fore and middle tibiæ each with two long bristles. (Fla.).*pruinosus* Coq.

47 Costa with erect cilia 48
Costa without erect cilia 49
48 Second joint of fore tarsi shorter than any of the following joints. (U. S.) .... *mundus* Wied.
Second joint longer than any following. (Mex.) .... *hirtipes* Ald.
49 Middle metatarsi with erect cilia above. (Mex.) ..... *ciliipes* Ald.
Middle metatarsi not so ciliated 50
50 Middle tibiæ black 51
Middle tibiæ yellow 52
51 All tibiæ black, fore tarsi with second and third joints subequal, fourth and fifth longer but also subequal. (Western States.) *pilicornis* Ald.
Fore tibiæ yellow, last four joints of fore tarsi regularly decreasing in length. (U. S., W. I.) .... *chrysoprasius* Walk.
52 Hypopygium large, its appendages large, curved, forceps-like; abdomen with two long wavy bristles at tip. (Mex.) *forcipatus* Ald.
Hypopygium small or only moderately large, abdomen without long bristles at tip 53
53 Hind tibiæ and halteres yellow. (Hayti.) .... *hirtulus* Bigot
Hind tibiæ and halteres infuscated. (Mex.) ...... *purpureus* Ald.
54 Wings with dark markings 55
Wings wholly hyaline 63
55 Antennæ yellow. (Mex., Brazil.) .... *basilaris* Wied.
Antennæ black 56
56 Hyaline space between the cross-bands reaching forward to the second vein 57
Hyaline space not reaching beyond the third vein 59
57 First joint of the fore tarsi white at tip, the following joints black, fourth fringed with black hair above. (Mex.) .. *interceptus* Ald.
Fore tarsi plain, gradually infuscated 58
58 Fore coxæ black. (Mex.) .... *pennifer* Ald.
Fore coxæ yellow. (Mex.) .... *flavicoxa* Ald.
59 Second and third joints of fore tarsi stout, swollen, bristly. (Mex.) *clavipes* Ald.
Fore tarsi plain or only bristly 60
60 Fore coxæ green. (La.) .... *viridicoxa* Ald.
Fore coxæ pale 61
61 Middle metatarsi with a row of erect cilia on the front surface. (U. S.) .... *scaber* Loew
Middle metatarsi plain 62
62 Middle tibiæ with a row of bristles on the front surface. (U. S.) *sipho* Say
Middle tibiæ with only scattered bristles. (Ga., Fla.) . *furcatus* V. D.

63 Face with numerous pale hairs 64
Face bare 65
64 Fifth joint of all the tarsi black, fifth joint of hind tarsi cylindrical. (U. S.) ....*flavipes* Ald.
Fifth joint of fore and middle tarsi whitish, last joint of hind tarsi a little flattened and orbicular in outline. (N. Y., Va.) *banksii* Ald.
65 Middle metatarsi greatly elongated, ciliated. (W. I.) *insularis* Ald.
Middle metatarsi plain 66
66 Face and front green, antennæ black, fore femora entirely yellow. (Mex.) ....*tonsus* Ald.
Face and front violet, antennæ reddish brown, arista long, fore femora blackened at base. (Hayti.) ....*pampoecilus* Bigot
67 Antennæ entirely black 68
Antennæ yellow, at least at base 71
68 Coxæ and base of femora black. (Hayti.) ....*polycroma* Bigot
Femora and fore coxæ wholly yellow 69
69 Coxæ yellow, middle pair blackened at base, costa with a notch before the tip of the second vein. (Ga., Fla.) .....*costalis* Ald.
Fore coxæ yellow, middle and hind coxæ black, costa without a notch 70
70 Very bright and shining, hypopygium large with black appendages. (U. S.) ....*scintillans* Loew
Dulled with grayish pollen, hypopygium small with the appendages partly yellow. (Ga.) ....*pollinosus* V. D.
71 Dorsum of the thorax yellow with a green or blue stripe 72
Dorsum wholly metallic 73
72 Pleuræ yellow, middle tibiæ and metatarsi with erect cilia. (W. I.) *flavidus* Ald.
Pleuræ with an indistinct dark spot, tarsi plain. (W. I.) *dorsalis* Loew
73 Thoracic dorsum opaque, pollinose. (East U. S.)...*pallens* Loew
Thoracic dorsum shining 74
74 Middle coxæ infuscated on the outer side for at least half their length 75
Middle coxæ wholly or almost wholly yellow 80
75 Costa of the male with erect cilia 76
Costa of the male without such cilia 77
76 Costa with an angular projection near the tip. (Southern States.) *psittacinus* Loew
Wing of the male flattened in outline at apex but the front corner rounded. (Ga.) ....*bradleii* n. sp.

77 Middle femora of male shortened, dark at base, their tibiæ and tarsi very much elongated 78
Middle femora normal 79
78 Middle tarsi with the last three joints much flattened. (N. Y.) *noveboracensis* n. sp.
Middle tarsi plain. (Eastern States.) ....*filipes* Loew
79 Abdomen yellow at base above, thorax coppery or golden on the sides of the dorsum. (East U. S., W. I.) ......*variegatus* Loew
Abdomen not pale at base, thorax green, more bluish-green along the front. (Cuba)................................*castus* Loew
80 Fore femora with slender erect bristles below. (U. S.) *tener* Loew
Fore femora without such bristles 81
81 Hind margin of the pleuræ yellow 82
Hind margin of the pleuræ green. (Mex.) ....*mexicanus* Ald.
82 Abdomen with basal yellow band, remainder green. (U. S.) *unifasciatus* Say
Abdomen with the greater part of the first four segments yellow. (U. S.) ....*rotundiceps* Ald.

Sciapus dimidiatus Loew.

I have seen seven males of this species from Arizona. The tibiæ were more brown than yellow, especially the hind ones; the hyaline tip to the wing is not over one-third the length of the wing, reaching just to the forking of the fourth vein (Fig. 1); the tegulae are entirely black, instead of being bordered with black, as Loew states; the outer appendages of the hypopygium are pointed lamellae, and are of a blackish color with rather long hairs on the inner edges. These differences are probably only individual.

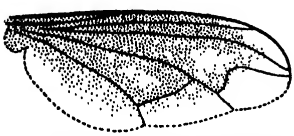
Fig. 1.—Wing of *Sciapus dimidiatus* Loew.

Sciapus banksii n. sp.

Face with white hairs; antennæ, cilia of the tegulæ and middle and hind coxæ black; fore coxæ and all the legs yellow; fifth joint of fore and middle tarsi white; wings hyaline. Length 4 mm.

♂. Face and front metallic green with yellowish brown pollen which does not conceal the ground color; face with slender white hairs; antennæ black; arista about two-thirds as long as the width of the head.

Thorax and abdomen metallic green, in some individuals more blue green, except the posterior half of the abdomen, which is golden green;

hypopygium very small with concealed appendages; incisures of the abdomen narrowly black; bristles of the thorax of moderate length, those of the abdomen short; pleuræ greenish black.

Fore coxæ yellow; middle and hind coxæ black; trochanters, femora, tibiæ and tarsi yellow; fore and middle tarsi a little darker towards the tips and with the fifth joints white; hind tarsi blackened from the tip of the first joint, about three-fourths as long as their tibiæ, first joint nearly as long as the remaining four joints together, fourth shorter than the fifth, about as broad as long, fifth a little flattened, nearly orbicular in outline, deep black; middle and hind tibiæ with a small bristle on the basal third; hind tibiæ and tarsi with rather long hairs.

Halteres yellow; tegulæ brown with black cilia.

Wings hyaline, only slightly tinged with gray; venation as in *S. flavipes* Ald.

♀. Two females taken with the males described above have the face more blackish; fifth joint of fore and middle tarsi are not white; hind tarsi normal; the abdomen more golden green than in the male.

Described from three males and two females taken by Mr. Nathan Banks, at Falls Church, Virginia, July 4th and 6th. He took one male at Sea Cliff, Long Island, New York. Type in the collection of Mr. Nathan Banks.

This interesting little species, which I dedicate to its captor, could easily be mistaken for *S. flavipes* Ald. which it resembles in size and color, but in that species the fifth joint of all the tarsi is black, while in this species the fore and middle tarsi have the fifth joint white, contrasting with the darker joints which precede them; the hind tarsi do not have the fifth joint flattened as in this species. I think it would be difficult to separate the females of the two species.

Sciapus bradleii n. sp.

First two joints of the antennæ yellow; abdomen with yellow at base; wings with the apex flattened in outline and with the front apical corner rounded; costa with erect cilia. Length 4.5 mm.

♂. Face and front metallic green, the former thickly covered with white pollen; palpi, proboscis and two basal joints of the antennæ yellow, the third joint of the antennæ small, rounded, brown; arista about as long as the width of the head.

Thorax dark metallic green, with grayish pollen; pleuræ more blackish green with white pollen; scutellum blue green with two strong bristles inserted widely apart.

Abdomen paler green and dull with pollen, the venter and some of the incisures yellow, first segment largely yellow, last three segments with coppery reflections; hypopygium small, mostly concealed, with the rather long outer appendages yellow.

Legs and coxæ pale yellow; middle coxæ blackish on the outer surface for half their length; middle femora with one slender black bristle near the tip on the hind edge, and a few black hairs on the upper hind edge towards the tip; middle femora, tibiæ and metatarsi of about equal length; middle tibiæ with a slender bristle close to the tip, this bristle fully twice as long as the diameter of the tibiæ; middle tibiæ and metatarsi with long hair; hind tarsi as long as their tibiæ and black from the extreme tip of the first joint.

Cilia of the tegulæ white.

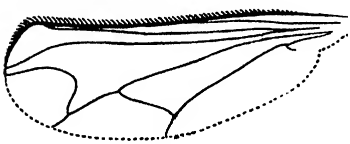

Fig. 2.—Wing of *Sciapus bradleii* n. sp.

Wings with the front apical corner rounded, the second vein entering the costa before this rounding begins, second vein running close to the costa and parallel with it for some distance before entering it; costa with erect cilia which are longest at the tip of the second vein, rapidly decreasing in length beyond this point. (Fig. 2.)

Described from one male from St. Simon Island, Georgia, taken about the first of May, by Dr. J. C. Bradley. Type in the Cornell University collection.

Sciapus noveboracensis n. sp.

Two basal joints of the antennæ yellow; hypopygium large with long appendages; femora mostly yellow; middle tibiæ extraordinarily long and slender; middle tarsi flattened and contorted; cilia of the tegulæ white. Length 6 mm.

♂. Face and front metallic green with yellow pollen, the pollen more whitish on the lower part of the face; antennæ short, the two basal joints yellow, third joint black; arista black, inserted near the base of the third joint, hardly as long as the width of the head.

Dorsum of the thorax dark metallic greenish blue with thin yellowish pollen; pleuræ green with white pollen; bristles of the thorax rather long.

Abdomen metallic green, thinly covered with yellowish pollen, and with black incisures, with a few long yellow hairs at base above, and with about six black bristles near the hind margin of the segments; hairs on the venter rather long and white; hypopygium large, black, with long appendages which are yellow towards their tips.

Middle and hind coxæ black. Fore coxæ yellow with long white

hairs on the front surface; fore femora short, pale yellow, with a few long pale bristles below near the base; fore tibiæ yellow, longer than their femora, short-haired; fore tarsi long and slender, blackened almost from the base, the metatarsi one and one-fourth times as long as their tibiæ, remaining joints taken together only about one-third as long as the first. Middle legs extremely slender (fig. 3), femora rather short, of normal size at base but tapering rapidly so as to be very slender in the middle, the knee large and contorted; middle femora black at base, pale yellow from before the middle; middle tibiæ extremely long and slender, over 5 mm. long, wire-like, black except extreme base, glabrous; middle metatarsi still more slender, two-thirds as long as their tibiæ with a row of short spines below towards the tip, black; second joint black, slender but short, with long hairs above; third joint short, flattened, widened at tip, fringed with long hairs on one edge; fourth joint short, flattened, wider than the third, bent or twisted, with only a few short hairs; fifth joint short, yellow at base and black at tip, bent, not so greatly flattened as the two preceding joints; third and fourth joints yellow. Hind femora yellow, long and slender with a few long yellow hairs above at base; hind tibiæ a little longer than their femora; hind tarsi shorter than the hind femora, black from before the middle of the first joint, first joint longer than the remaining four together, somewhat thickened in the middle.

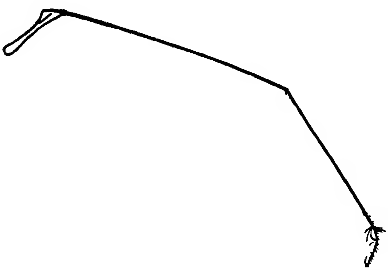

Fig. 8.—Middle leg of *Sciapus noveboracensis* n. sp.

Halteres yellowish; tegulæ pale yellow with a narrow black tip and with long white cilia.

Wings grayish hyaline, long and rather narrow.

♀. Length 4 mm. Differs from the male in having the pollen of the face silvery white; thorax and abdomen covered with an equally thick coat of coarse yellowish pollen; all legs normal; all tarsi blackened from the base of the second joint.

Described from one male and one female, taken at Gowanda, New York, June 8th. Type in the author's collection.

This belongs to the same group of species as *S. tener* and *filipes* of Loew, the middle legs of which are slender; the hypopygium is formed about alike in all three species and the wings are also very much alike.

The Longevity and Mating Habits of Dichromorpha viridis Scud. (Orth.).

By Phil Rau, St. Louis, Missouri.

During July and August, 1909, I had an opportunity to record the adult longevity and the mating habits of this Orthopteran species.*

The adult hoppers, nineteen males and six females, were taken in my garden and confined in lamp-chimney breeders containing growing grass. The table shows that the females lived from 23 to 34 days (with one exception), while the males lived only from one to ten days, most of them living 3 or 4

Table I.

SEX	LENGTH OF LIFE IN DAYS	NO. OF INDIVIDUALS
♀	34	1
♀	33	1
♀	29	1
♀	28	1
♀	23	1
♀	4	1
♂	1	3
♂	2	2
♂	3	5
♂	4	5
♂	6	1
♂	7	1
♂	8	1
♂	10	1

days. How old the insects were when captured is unknown, but since they were all taken within a few days, it is probable that all were of approximately the same age. Thus we see the significant difference in the length of life of the sexes. The short life of the males may be due to the conditions of confinement affecting the male and not the female, but it is more likely that the males are naturally short-lived since none were observed to take food; the females, however, were heavy feeders, often eating while in copulation. There was nothing in

*Mr. A. N. Caudell kindly identified this insect.

the behavior of the males to indicate senescence due to old age. They always seemed active and mated readily, even remaining in copulo, in a number of instances, up to just a few hours before their death.

In the cages these insects were polygamous and polyandrous, a male mating many times with the same or other females, and a female mating often with one or many males.

TABLE II.

♀ No.	NO. OF TIMES IN COPULA	NO. OF MALES MATED	LENGTH OF EACH COITION IN HOURS	TOTAL TIME IN HOURS SPENT IN COPULA
1	3	2	7, 10, 6½	23½
2	6	2	8, 5, 26½, 15, 6, 12	72½
3	8	3	4, 8, 7, 15, 3, 30½, 7½, 9½	84½
4	7	3	10, 1, 13, 4½, 5, 8, 12	53½
5	5	2	11, 34, 6, 6, 12	69
6	6	1	25, 6, 6	37

Table II shows that these females during their lives mated from 3 to 8 times with from 1 to 3 males which were virgin or had already fertilized other females; that the duration of each coition varied from 1 to 34 hours; and that the total number of hours spent in mating by each female varied from 23½ hours to 84½ hours. In fact, the females mated whenever a male was available. In only one instance was an attempt made to oviposit. In this case the female spent several hours with her ovipositor buried in the earth, but an examination later showed that no eggs were deposited.

Corrections to Paper on Andean Muscoidea (Dipt.).

Mr. Walton has called my attention to two errors which have crept into my paper published in Pr. U. S. N. M., Vol. 43 (1912). They are:

Page 309, *Oestrogaster,* third line, should read "well developed palpi" instead of "no palpi." The palpi were both so closely appressed to the folds of the proboscis that they entirely escaped my observation at time of making description.

· Page 333, *Dejeania andina,* sixth line, should read "Differs in having no black whatever on legs" instead of "no yellow whatever." This was a clerical error, as shown in context.—CHARLES H. T. TOWNSEND, Bureau of Entomology, U. S. Dept. Agric., Washington, D. C.

A Second Bromeliad-Inhabiting Crane-fly (Tipulidae, Diptera).

By CHARLES P. ALEXANDER, Ithaca, New York.*

In ENTOMOLOGICAL NEWS for November, 1912, the author described, as *Mongoma bromeliadicola,* a Costa Rican crane-fly that had been bred by Mr. Picado from larvae dwelling in the water of bromeliaceous plants. Since that article was written, specimens of a second species, allied to *M. bromeliadicola,* have been received from the U. S. National Museum through the kindness of Mr. Frederick Knab, and this species is characterized in this article.

Mongoma leucoxena sp. n.

Cross-vein *r* just before the fork of *R2* plus 3; wings subhyaline with the tip a little darkened; legs black with the tip of the femur and the base and tip of the tibia white; all the tarsi white.

Male.—Length, about 9.8 mm.; wing, 8 mm.

Female.—Length, 10.4 mm.; wing, 8.8 mm. Fore leg, femur, 11.3 mm.; tibia, 12.3 mm.; tarsus, 10 mm. Middle leg, femur, 12 mm.; tibia, 11.3 mm.; tarsus, 8.9 mm. Hind leg, femur, 12 mm.; tibia, 11.4 mm.; tarsus, 7.7 mm.

Rostrum and palpi brownish black. Antennae rather long, dark brown; the flagellar segments elongate oval. Head light fawn yellow with an elongate dark brown mark on either side of the vertex.

Thoracic praescutum yellowish brown with three reddish brown stripes, the median one narrower, darkest behind, indistinct in front; lateral stripes indistinct. Scutum with the lobes reddish brown, the median space paler. Scutellum and postnotum reddish brown. Pleurae dull yellow, more reddish on the dorsal mesopleurites before the wing root.

Halteres rather short, dark brown, pale at the base.

Legs, fore pair, coxae and trochanters dull yellow, femora brownish black with the tip broadly white, tibia with a white basal annulus subequal in width to the femoral ring, apical third of the tibia white, remainder dark brown, tarsi white, claws brown; middle and hind legs similar but the white tibial apex rather narrower including about two-sevenths of the segment.

Wing subhyaline or nearly so, iridescent, the tip slightly darkened; stigma rounded dark brown; veins dark brown. Venation: Cross-

*Contribution from the Entomological Department of Cornell University.

vein *r* slightly before the fork of *R2* plus 3, the distance about equal to one-quarter of the cross-vein *r*.

Abdominal tergites dark brown, the lateral margins rather bright yellow; ovipositor reddish chestnut; sternites yellow.

Holotype, ♀, Cordoba, Mexico. Larva in the water of bromeliads; adult issued April 20, 1908. (Frederick Knab.)

Allotype, ♂, Topotypic; adult issued May 5, 1908.

Type in the U. S. National Museum; allotype in the author's collection.

Since *Mongoma bromeliadicola* was first described, Mr. Picado's excellent work on the fauna of the bromeliaceous epiphytes has appeared and in this paper the author has given a plate and figures of the larva and pupa of this insect.† *M. leucoxena* differs from all the known forms with pale knees in its uniformly white tarsi.

The Real Trigona dorsalis Smith Rediscovered (Hym.).

By T. D. A. Cockerell, Boulder, Colorado.

Mr. Frederick M. Gaige, of the University of Michigan, sends me three workers of *Trigona* which he collected recently in Colombia, when a member of the Bryant Walker Expedition. The following data concerning them are taken from his note book:

"Cincinnati Coffee Plantation (20 miles inland from the port of Santa Marta). July 12, 1914. Altitude, 5,000 feet. Stingless bees; found colony in deep forest, situated at foot of huge buttressed tree; had cylindrical tunnel of wax cemented on side of one buttress, with end free from the bark, ¾ inch in diameter, opening rather more than ¼ inch. This is entrance to nest, 20 inches long, leading to ground in gradual curve. Several bees about the opening, both entering and

† Les Bromeliacees Epiphytes. C. Picado. Bull. Scient. de la France et de la Belgique; 7th series, vol. 47, fasc. 3, pp. 356, 357, pl. 13, figs. 1, 2, 4.

coming out. Could not open nest. Bees not easily disturbed." (No. 124.)

Upon examination, the species appeared to be new. It was seen to be closely allied to *T. ziegleri mayarum* Ckll., from Guatemala, but that insect has clear (suffusedly yellowish) wings, a larger mesothorax, and is much less densely pubescent. It was also close to a specimen labelled "*T. dorsalis* Sm.," from Smith's collection, but that has yellow bands along the inner orbits to the summit, less pubescent front, differently colored wings, etc.

Unfortunately, however, confusion has arisen concerning the application of the name *T. dorsalis* Smith. Friese has applied it to *T. pectoralis* D. T., which agrees neither with Smith's description nor with my Smithian specimen. Two descriptions of *T. dorsalis* by Smith are extant; the first published (Cat. Hym. Brit. Mus.) in 1854; the second (Trans. Ent. Soc., Lond.) in 1863. Upon comparison, discrepancies appear. Thus, in 1854, it is said that the wings are testaceous, in 1863 that they are hyaline. My supposed co-type, one of Smith's own specimens, is the insect of 1863, but what of the *dorsalis* of 1854 from Pará; could it be the insect found by Mr. Gaige? The description certainly suggested such a possibility. At this point I forwarded my description to Mr. G. Meade-Waldo, of the British Museum, with a statement of my perplexity. He now kindly replies that he finds in the Museum two distinct species under *dorsalis*, one the original insect of 1854, the other that of 1863, bearing, like my Smithian specimen, the number 18. My description of Mr. Gaige's insect fits the true *dorsalis* "admirably," and is "without any doubt" that species. I give this description herewith, as Smith's account is too brief.

Trigona dorsalis Smith.

Length nearly 7 mm.; abdomen long and comparatively narrow; head broad, black, with the clypeus, triangular supraclypeal mark, triangular lateral marks (filling space between clypeus and eye, and sending a slight linear process upwards along orbit), labrum and mandibles chrome yellow; mandibles with a broad simple outer cutting edge,

and two sharp teeth on the inner side, near the inner angle (the innermost representing that angle); malar space linear in front, broadened behind; front and face with fine fulvous tomentum, not concealing surface, but giving it a strong yellowish cast; vertex with denser and longer hair; cheeks covered with a dense fulvous felt, wholly hiding surface; thorax, except middle of metathorax, closely beset with fulvous hair, so that the color of the tegument is much obscured; mesothorax black with the lateral margins narrowly yellow; scutellum yellow; sides of thorax fulvous yellow, with a more or less distinct vertical dusky band on pleura; middle of metathorax broadly black, sides fulvous yellow; scape yellow, with a black stripe on upper end above; flagellum black above, testaceous beneath; legs clear fulvous, the broadly expanded apical half of hind tibiæ black, the black surface invaded on inner side by a broad band of very short fulvous tomentum, the tibial margins with long black and fulvous hairs; hind basitarsi black on outer side, on inner side densely covered with fulvous hair; tegulæ fulvous; wings bright orange fulvous, only slightly translucent; abdomen clear fulvous, yellower beneath.

I fail to find a name applicable to the *T. dorsalis* of 1863, so it may be called

Trigona meade-waldoi n. n.

Notes on Trichogrammatidae (Hymen.).

1. *Trichogramma minutum* Riley. The following new host and localities: *Olene pinicola* Dyar at Greenwood and North Saugus, Massachusetts, and Wascott, Wisconsin. Data from P. H. Timberlake. The Wisconsin record was made by Mr. N. A. Thomson. Specimens identified by myself. Through the Bureau of Entomology at Washington.

2. *Oligosita sanguinea* (Girault). One male, two females reared by Mr. Timberlake at Salt Lake City, Utah, June 7, 1913, from cold storage material accompanying cocoons of *Phytonomus posticus*, collected at Portici, Italy, by Mr. Thomson about the middle of May, 1913. The material consisted mostly of leaves and stems of alfalfa. The species is very common in North America, which is probably its native home. I would suggest as being most probable, that it had been introduced into Europe in connection with commerce in grasses. It has not been known previously from Europe, but this may be due to the fact that collections in this family are fragmentary there.

In this connection it should be noticed that the wings of the yellow male were perfect but narrower and shorter than those of the female. —A. A. GIRAULT, Nelson (Cairns), Queensland, Australia.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., JANUARY, 1915.

Hints on Packing Insects for Transportation.

Dried insects are exceedingly delicate and will not stand any sudden jarring or the least knock, especially when pinned. Such material has so often been received here at the Academy of Natural Sciences in broken condition on account of improper packing, that a few words on this subject will be appropriate. NEVER SEND PINNED SPECIMENS IN A SINGLE BOX WITHOUT SURROUNDING THE BOX WITH SOME SPRINGY MATERIAL, such as dry sea grass, excelsior, or cotton. The box should be light and strong with the lid so made that it will not crush in. The pins bearing the specimens should be firmly pushed in the cork, which should be securely fastened or glued to the bottom or sides of the box. The box should then be wrapped in soft paper to exclude any dust that may arise from the packing. The packing should be loosely wrapped around the box, say an inch or more in thickness, and held intact by placing the whole in another box or by wrapping it in heavy paper and securely tying with strong string. DON'T pack the springy material so tightly that it is useless as a preventive of jarring. Give attention to the corners and DON'T let them come in contact with the container, be it box or paper. A chip basket with handle makes a good container when a large box is sent by express. It is a good plan to place a layer of raw cotton over the cork, but never over the specimens. Heavy specimens that are liable to swing on their pins should be braced by a stout pin against each edge of the abdomen. Always remember if one specimen becomes loose it ruins many, and that "one fine, faultless specimen is worth no end of trash."—E. T. C., JR.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Change of Address.

E. P. Van Duzee *to* University of California, Dept. of Entomology, Berkeley, Cal.

Notes on the Siricidae of California (Hym.).

1. *Sirex apicalis* male of *areolatus.*

In October of 1907 I collected at Messa Grande, Sonoma County, California, five Siricids (two males and three females) that were flying about together. The females had also been seen depositing their eggs in some freshly cut redwood logs.

Dr. E. C. Van Dyke tells me this latter observation is of some economic importance, the species of the Siricid that bores into redwoods having been previously unknown. This insect is the most common of the few that bore into the heartwood of the tree.

Though not found in the act of copulation, the flight of these insects together makes me believe they are male and female of a single species. Both sexes are common about the San Francisco bay region, specimens in the California Academy of Science and in my own collection having been taken from San Mateo, San Francisco and Alameda Counties.

Using Dr. J. C. Bradley's paper, "The Siricidae of North America" (Reprint Jr. Ent. & Zool. Pomona College, Claremont, California, April, 1913), the females fit the description given for *Sirex areolatus,* race *areolatus* (Cresson) Kirby. The male, however, runs down to *Sirex apicalis* Kirby.

Konow has already considered *apicalis* to be a synonym of *areolatus* and has described a male and female from Vancouver as *Paururus areolatus.* On the other hand, Bradley believes his new species *Sirex obesus* to be the female of *apicalis.* This is apparently very improbable, as I have compared a female of this species and find it very different from the female of "apicalis."

We can therefore assume for the present that *Sirex apicalis* is the male of *areolatus* and that the name for this species should be *Sirex areolatus* (Cresson) Kirby.

2. New Localities.

Urocerus albicornis (Fab.) Harris, taken July, 1912, as far south as Castella, Cal.

Sirex obesus Bradley, taken August, 1906, as far west as Nevada City,. Cal.

Sirex apicalis Kirby, as far south as San Mateo County, Cal.—J. P. BAUMBERGER, Bussey Institution, Forest Hills, Boston, Mass.

Identification of Specimens.

For the mutual benefit of the collector or amateur entomologist, and the specialist who desires to examine all the material possible in the groups in which he is interested, the NEWS reserves space for listing those who are willing to determine such material. The collectors must bear in mind that the material must be in first class condition accompanied with full data as to date and location of capture; must be pinned (excepting Coccidae and other minute insects which require special treatment) and properly packed. Specimens not in such condition will be returned at the expense of the sender. Hints in packing insects for transportation may be found in this number, page 33. The transportation to the specialist must be prepaid. The specialist is to have the privilege of retaining the first set of any species he may desire.

Any specialist not listed but willing to make determinations, and any of those listed below who no longer care to do such work, please advise the editor of this journal.

The following specialists will determine material in their respective groups, from North America, unless otherwise noted. Those names preceded by (*) should be communicated with before sending specimens, as their time for such work is limited, or they are interested only in special groups or genera.

DIPTERA.—*Chironomidae* and *Mycetophilidae*: O. A. Johannsen, Cornell Univ., Ithaca, N. Y.; *Empididae*: A. L. Melander, Pullman, Wash.; *Syrphidae*: A. L. Lovett, Corvallis, Oreg.; *Acalyptratae,* especially *Ephydridae*: E. T. Cresson, Jr., Acad. Nat. Sci., 1900 Race St., Phila., Pa.

HEMIPTERA.—*Jassidae*: E. D. Ball, Logan, Utah; *Aphididae* (material in this family should be provided with complete data on food plants, correct scientific names of same, date and location of capture): C. P. Gillette, Fort Collins, Col., H. F. Wilson, Corvallis, Ore., Edith M. Patch, Orono, Me.; *Psyllidae* (see note under Aphididae): Edith M. Patch, Orono, Me.; *Aleyrodidae*: J. R. Watson, Gainesville, Fla.; *Coccidae*: *J. G. Sanders, Madison, Wis.; *Chionaspis, Hemichionaspis* and *Phenacaspis* of the world: R. A. Cooley, Bozeman, Mont.

HYMENOPTERA.—*Tenthredinidae* and *Uroceridae*: *A. D. MacGillivray, 603 W. Michigan Ave., Urbana, Ill.; *Aphidiinae* and *Ophiinae*: A. B. Gahan, College Park, Md.; *Chalcidoidea*: A. A. Girault, Nelson (Cairns), Queensland, Australia; *Megastimus*: C. R. Crosby, Cornell Univ., Ithaca, N. Y.; *Sphecidae*: H. T. Fernald, Amherst, Mass.; *Apoidea*: E. G. Titus, Logan, Utah; from Nebraska, Myron H. Schwenk, Lincoln, Neb.

MALLOPHAGA & ANOPLURA.—*V. L. Kellogg, Stanford Univ., Cal.

NEUROPTERA.—W. E. Hinds, Auburn, Ala.

ORTHOPTERA.—*J. A. G. Rehn, Acad. Natural Sciences, Phila., Pa.

LEPIDOPTERA.—*Rhopalocera*: Henry Skinner, Acad. Natural Sciences, Phila., Pa.

Army Worm Plague in Philadelphia (Lep.).

The army worm (*Leucania unipuncta*), the moth of which is always more or less common around Philadelphia, proved a veritable plague last year (1914). The first brood of the moth made its appearance about the twentieth of June. The young worms were noticed by the writer about July sixth, but the general public did not notice them until about July fifteenth, at which time the worms were from one-quarter to three-quarters of an inch in length. There was scarcely a section of Philadelphia that did not have more or fewer of the worms. Newspapers, of course, exaggerated the matter, although it was bad enough. I visited a number of places where the worms were said to number in the thousands, but in many cases found they could be numbered in the hundreds. In some gardens I found plenty of worms, while in adjacent gardens none were to be found. Investigation in most cases showed that the gardens seriously affected were those that were not kept in order—long grass and weeds having full possession. Contrary to the generally accepted theory, that the worms ate the grass clean down to the ground, I found that they often left from a quarter to a half inch of the base of the grass blade remaining. It has been noticed that the army worm ofttimes becomes a plague when a wet season follows a dry one, and this was just the condition of affairs around Philadelphia last year. Our spring was unusually dry, little rain fell during the month of April, and only four and a half inches during the two months of May and June. July was just the opposite, seven and three-quarter inches of rain falling. The majority of worms reached their full growth about the first of August. The moths from these worms started to emerge from the pupa about the eighth of August, the great majority emerging between the tenth and thirteenth. The moth is attracted to the electric light, but not to such an extent as one would suppose, considering the number of moths there are around. While sugaring for moths, *Leucania unipuncta* often proves a nuisance, coming in such numbers to the bait as to preclude the more desirable moths that the collector wishes to secure. The second crop of full grown worms was observed around the eighteenth of September, but they were so few in number that the general public did not notice them. Spraying with a mixture of arsenate of lead and water, and the sieving of dry slacked lime over the places infested, was found to be effective in destroying the worms. A mixture of Paris green and bran was recommended, and used to some extent, but some of our bird friends objected to this method, claiming that many of our birds lost their lives through its use.—PHILIP LAURENT, Mt. Airy, Philadelphia.

Two Rare Wasps (Hym.).

In the Rehn and Hebard material I have found two species of Hymenoptera which I think should be recorded.

Mutilla slossonae Fox. Tr. Am. Ent. Soc. XXV, p. 273, March, 1899, Type locality Florida, described from one specimen, a female. A second specimen was captured at Loggerhead Key, Dry Tortugas, Fla., July 8, 1912. This is also a female.

Sphecius hogardii Latreille, described under *Stizus* in Gen. Crust. et Ins. I, pl. xiii, f. 12, 1806. Type locality, "S. Domingue." There are six specimens from Cuba and one from San Domingo in the collection of the American Entomological Society. R. and H. turned up a female at Long Key, Monroe Co., Fla., July 13, 1912, this being, as far as I know, the first specimen from the United States.—GEO. M. GREENE.

Dragonflies Devouring Winged Ants (Odon., Hymen.).

On the morning of April 15, 1912, as I was sitting on the hotel porch at New Smyrna, Florida, about 10 o'clock, I observed a large number of dragonflies gathering and circling through the air. The number of these insects increased until they were as numerous as I ever saw insects around an arc light in a northern county seat in mid-summer. There appeared to be several species: one a very large brilliant green, one that seemed purplish and one that was smaller and showed brownish-red. Upon going to the place about which they were circling, I discovered a swarm of winged ants upon a front fence post. These, when they had climbed the post to the top, took wing, sometimes singly, sometimes many at once. The gathering dragonflies would dart upon them and seize and devour them. Many were caught before they were a yard above their starting place. None appeared to rise higher than 20 feet. We watched them for some minutes and in that time, while hundreds took wing, none appeared to escape their enemies. A dragonfly seldom missed his mark. If an ant was missed, another destroyer got it. The dragonflies are generally known here as mosquito hawks. By the time the first colony of winged ants was gone another smaller company made its appearance about the porch foundation and the dragonflies turned their attention there until they were destroyed.—AMOS W. BUTLER, Indianapolis, Indiana.

[This note recalls the observation by Mr. C. W .Johnson, recorded in the NEWS, Vol. x, p. 219, Sept., 1899, to the effect that *Aeshna ingens*, probably the "very large brilliant green" species mentioned above, "is extremely destructive to bees in Florida," and also the remark of Mr. Davis, *l. c.*, xxv, p. 191, on dragonflies catching smaller butterflies in the same State.—ED.]

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record. Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

2—Transactions of the American Entomological Society, Philadelphia. **3**—The American Naturalist. **4**—The Canadian Entomologist. **11**—Annals and Magazine of Natural History, London. **18**—Ottawa Naturalist. **22**—Zoologischer Anzeiger, Leipzig. **40**—Societas Entomologica, Zurich. **42**—Journal, Linnean Society, Zoology, London. **50**—Proceedings of the U. S. National Museum. **51**—Novitates Zoologicae, Tring, England. **56**—Mittheilungen, Schweizerischen entomologischen Gesellschaft, Schaffhausen. **97**—Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **123**—Bulletin, Wisconsin Natural History Society, Milwaukee. **141**—Proceedings, Indiana Academy of Sciences, Indianapolis. **143**—Ohio Naturalist. **153**—Bulletin of the American Museum of Natural History, New York. **166**—Internationale Entomologische Zeitschrift, Guben. **169**—"Redia," R. Stazione di entomologia Agraria in Firenze. **179**—Journal of Economic Entomology. **186**—Journal of Economic Biology, London. **193**—Entomologische Blatter, Cassel. **207**—Anales, Academia de Ciencias Medicas, Fisicas y Naturales de la Habana, Revista Cientifica. **279**—Jenaische Zeitschrift fur Naturwissenschaft. **303**—Entomologiske Meddelelser, udgivne af Entomologisk Forening, Copenhagen. **324**—Journal of Animal Behavior, Cambridge. **335**—Smithsonian Miscellaneous Collection. **369**—Entomologische Mitteilungen, Berlin-Dahlem. **394**—Parasitology, Cambridge, England. **411**—Bulletin of the Brooklyn Entomological Society. **434**—Abhandlungen k. k. Zoolog.-Botanisch. Gesellschaft in Wien. **447**—Journal of Agricultural Research, Washington. **457**—Memoirs of the Coleoptera, by Thos. L. Casey, Washington. **490**—The Journal of Parasitology, Urbana, Illinois. **491**—The Annals of Applied Biology, Cambridge, England. **492**—Transactions of the San Diego Society of Natural History. **493**—Oregon Agricultural College Experiment Station, Corvallis.

GENERAL SUBJECTS. **Berlese, A.**—Intorno alle metamorfosi degli insetti, **169**, ix, 121-38. **Chittenden, F. J.**—Pollination in orchards, **491**, i, 37-42. **Comstock, J. H.**—The Comstock Memorial. (Official Pub. of Cornell Univ., V. No. G.) **Escherich & Schwangart**—Zeitschrift fur angewandte entomologie. Band 1, Heft 2, Berlin. **Fuchs, C.**—Recollections of C. Fuchs by C. W. Leng, **411**, ix, 73-6. **Grinnell, F., Jr.**—The development of California entomology, **411**, ix, 67-73. **Headlee, T. J.**—Some data on the effect of temperature and moisture on the rate of insect metabolism, **179**, vii, 413-17. **Holmes, S. J.**—Literature for 1913 on the behavior of the lower invertebrates, **324**, iv, 383-93. **McIndoo, N. E.**—The olfactory sense of insects, **335**, lxiii, No. 9. **Standfuss, G.**—Auf grund der hinterlassenen tagebucher von seinen sohne M. Standfuss, **166**, viii, 139-40 (cont.). **Turner, C. H.**—(See under Arachnida.)

PHYSIOLOGY AND EMBRYOLOGY. **Brun, R.**—Die raumorientierung der Ameisen und das orientierungsproblem im allgemeinen (Jena, C. Fischer, 1914), 234 pp. **Dexter, J. S.**—The analysis of a case of continuous variation in Drosophila by a study of its linkage relations, **3**, xlviii, 712-58. **Foot & Strobell**—Results of crossing Euschistus variolarius and Euchistus servies with reference to the inheritance of an exclusively male character, **42**, xxxii, 337-73. **Forster, W. D.**—Observations of the eggs of Ascaris lumbricoides, **490**, i, 31-6. **Lomen, F.**—Der hoden von Culex pipiens, **279**, lii, 567-628. **Morgan, T. H.**—The failure of ether to produce mutations in Drosophila, **3**, xlviii, 705-11.

MEDICAL. **Jennings, A. H.**—Summary of two years' study of insects in relation to pellagra, **490**, i, 10-21. **Riley, W. A.**—Dr. Nott's theory of insect causation of disease, **490**, i, 37-9.

ARACHNIDA, ETC. **Macnamara, C.**—The snow-flea. **18**, 1914, 110-12. **Nuttall, G. H. F.**—Penetration of Ixodes beneath the skin; Tick abnormalities, **394**, vii, 250-7; 258-9. **Turner, C. H.**—Literature for 1913 on the behavior of spiders and insects other than ants, **324**, iv, 394-413.

Banks, N.—New West Indian spiders, **153**, xxxiii, 639-42. **Ewing, H. E.**—The common red spider or spider mite, **493**, Bul. No. 121, 95 pp.

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Die Grossschmetterlinge der Erde. Von Dr. Adalbert Seitz. Stuttgart, 1914.—Volume three of this colossal work has been completed, with 511 pages, 75 plates and 4338 figures. It marks an epoch in bookmaking in the Lepidoptera. This particular volume is devoted to the family Noctuidae, and as thousands of species are beautifully and accurately figured in color, it makes the work of the systematist a

pleasure instead of a burden to use it. To wade through numerous descriptions in numerous publications to identify species is a labor that few care to undertake. With a majority of the species in the Palæarctic fauna figured, it will be possible for students to take up special work and add greatly to the sum of our knowledge of these insects. A good figure is worth no end of "word pictures," but this should not be considered as advocating the doing away with descriptions entirely. Descriptive work should supplement the illustrations. The indices are properly alphabetically arranged and the letter press excellent. Species arranged under genera in an index is a most unfortunate arrangement in some works and conducive to profanity. Such a work as this will of necessity stimulate study and research and induce more students to take up the study of this branch of entomology. Dr. Seitz is to be congratulated on his industry and perseverance in getting out such a monumental work. It is to be hoped that he will be able to go on with the other parts of it.—H. S.

Doings of Societies.

FELDMAN COLLECTING SOCIAL.

Meeting of September 16, 1914, at the home of H. W. Wenzel, 5614 Stewart Street, Philadelphia. Thirteen members were present. President Wenzel in the chair.

Mr. Daecke said that some years ago, while at Bamber, New Jersey, in company with Mr. Fenninger, he had attempted to catch a large black *Mydas* (Dip.) which finally disappeared, but he had seen enough to identify it as *M. tibialis* Wied., a species generally found in Mexico, though the type locality is Baltimore, Maryland. He exhibited a specimen of this species collected by J. E. MacNeal at Perdix, Pennsylvania, July 19, 1914. He had received a species of Diptera, *Cordyligaster minuscula* V. der W., from Mr. Banks in East Falls Church, Virginia, and had captured the same species near Marietta, Pennsylvania, July 14, 1914. Also exhibited a moth rare in this State, *Calpe canadensis* Bethune, Riverview, June 23, 1914, and a beetle, *Purpuricenus axillaris* Hald., Rockville, Pennsylvania, July 19, 1914, which is of an unusual color, red instead of yellow.

Dr. Castle said he had been to Pine Beach, New Jersey, and the only species of Coleoptera common there was *Calosoma scutator* Fabr., which he had seen in great numbers.

Mr. Kaeber said he had found *Sitodrepa panicea* Linn. (Col.) in barley which he placed in a jar. After two years the

barley has entirely disappeared and the beetles all killed by a fungus disease.

Mr. H. A. Wenzel exhibited and recorded the following Coleoptera: *Saperda discoidea* Fabr. beaten from hickory along Cobbs Creek and Naylors Run, Pennsylvania, from latter part of June to September; in June males were more numerous than females, but toward the end of August the reverse was the case. *Oncideres cingulata* Say he had collected himself for the first time this year, the first specimen August 16 and the last September 6 in the same locality as the *Saperda*. The girdled twigs were also shown.

Mr. Geo. M. Greene exhibited *Sandalus petrophya* Knoch (Col.) collected by himself at East Falls Church, Virginia, August 7, 1914 (1), August 11, 1914 (2) and August 13, 1914 (1), all females and taken on oak. On August 16, 1914, at Overbrook, Pennsylvania, he had taken a male on oak and found a female ovipositing on beech. Also exhibited *Elater militaris* Harr., Ardmore, Pennsylvania, May 5, 1912. Recorded a specimen each of *Catocala relicta* Walker (Lep.), Overbrook, Pennsylvania, August 16, 1914, and *Papilio philenor* Linn., East Falls Church, Virginia, August 13, 1914.

Dr. Skinner said that the latter was very common at one time, but owing to the medicinal properties of its food plant it is now rare. He had planted some of its food plant in his yard at Ardmore, Pennsylvania, to see if he could attract specimens and later found the larvae on the bush. When these became full grown he placed them in a box, but the remaining larvae ate them as quickly as they pupated, although there was plenty of the food plant in the box.

Adjourned to the annex.

Meeting of October 21, 1914, at the same place. Thirteen members present. President Wenzel in the chair.

Mr. Laurent exhibited specimens of three species of Coleoptera captured at Mt. Airy, Pennsylvania, this year, as follows: *Strongylium tenuicolle* Say, July 21; *Xylotrechus quadrimaculatus* Hald., July 22, and *Myas coracinus* Say, July 22.

He stated that all three were rare, particularly the last, the specimen shown being the second he had captured during the thirty-six years he has been collecting.

Mr. Geo. M. Greene exhibited a specimen of *Dizonias lucasi* Bell. (Dip.) from the Rehn and Hebard material. This was collected at Long Key, Monroe County, Florida, July 13, 1912, Aldrich's List giving Mexico as habitat.

Mr. Daecke exhibited a roach from Harrisburg, Pennsylvania, September 25, 1913, with a species of fungus growing from it. Also *Rhagoletis cingulata* Loew (Dip.), which he collected at Riverview, Pennsylvania, June 23, 1914, on wild cherry, a species very rare here but commoner in the northern part of the State, New York and Canada. Mentioned a paper by C. W. Johnson on *Criorhina* and *Blera* (Dipt.) and exhibited *B. badia* Wlk., Castle Rock, June 3, 1914, and Inglewood, Pennsylvania, June 27, 1912, and *B. confusa* Johns. Digby, Nova Scotia, June 22, 1908 (J. Russell) and El Paso County, Colorado, July 2, 1914 (H. B. Champlain).

Mr. H. W. Wenzel exhibited his collection of *Oncideres, Saperda*, etc.

Dr. Castle said he had found two species of ground fungus, one at Pine Beach, New Jersey, September 14, and the other at Morton, Pennsylvania, September 20, which he had placed in separate boxes, and on September 25, one species of beetle, *Caenocara oculata* Say, began emerging from both by the thousands.

Adjourned to the annex.

GEO. M. GREENE, *Secretary*.

OBITUARY.

The month of November, 1914, witnessed the death of two distinguished naturalists, neither of whom was known primarily as an entomologist, although both of them did important work upon insects. Friedrich Leopold August Weismann died November 6, Charles Sedgwick Minot on November 19.

August Weismann, as his name commonly appeared, was born in 1834, at Frankfurt-am-Main, and studied Zoology under Henle at Göttingen and Leuckart in Giessen. Since 1866, he was Professor of Zoology and Director of the Zoological Institute of the University at Freiburg im Breisgau, Baden. In later years he bore the titles of Exzellenz and Wirklicher Geheimrat. The Royal Society of London elected him a foreign member in 1910, and the Entomological Society of London one of its twelve honorary fellows in 1898. He was recently reported to have renounced all his English distinctions. To zoologists generally and to the world at large he is chiefly known for his writings on the theory of Evolution and its correlations. The titles of the English translations of his works on these subjects are familiar to a wide range of readers: *Studies in the Theory of Descent* (translated by R. Meldola), 1880-81; *Essays Upon Heredity and Kindred Biological Problems* (edited by E. B. Poulton and others), 2 vols., 1889 and 1892; *The Germ Plasm, a Theory of Heredity*, 1893; *The Evolution Theory*, 2 vols., 1904; *The Selection Theory* (in Seward's *Darwin and Modern Science*), 1909. All of them contain many references to insects.

In these writings he emphasized the importance of the separation of the germ plasm from the somatic, or body, plasm from the earliest stages of individual development, and exposed the lack of definite evidence for the hereditary transmission to offspring of characters acquired during the life of an individual. In his famous controversy with Herbert Spencer, in the *Contemporary Review* for 1893, he appeared as the champion of the "All-Sufficiency of Natural Selection." Still later, in 1895 and 1896, he answered, theoretically at least, many objections which had been brought against Natural Selection by the formulation of the idea of Germinal Selection.

To Weismann are due such terms and expressions as biophors, amphimixis, idants, determinants, ids, continuity of the germ plasm, etc., which appeared so frequently in discussions of evolution and heredity in the last decade of the nineteenth century and the first of the twentieth, and during this period no one influenced biological thought more than he.

The development of insects early interested him, and the *Abhandlungen* of the Senckenberg Society of his native town for 1862-63 contains one of his first papers on this subject: *die Entstehung des vollendeten Insektes in der Larve und Puppe.* A paper on the embryology of various insects appeared in 1864 in the *Archiv für Anatomie und Physiologie.* The *Zeitschrift für Wissenschaftliche Zoologie* for 1863 and 1864 contained those two great memoirs, *Die Entwicklung der Dipteren im Ei* and *Die nachembryonale Entwicklung der Musciden,* results of nearly four years' work. The first of these dealt with the embryonic development of *Chironomus, Musca vomitoria* and *Pulex canis.*

From the second [Weismann wrote at the time] one will see how. in a very unexpected manner, the head and thorax of the fly together with their appendages are already formed in the larva, nay in the embryo, how they arise in the interior of the body cavity separated from each other and, after pupation, grow together into the parts of the fly's body. . . . . But not only the walls of the body in the family of the Muscidae exhibit such a peculiar history but also the internal organs are reformed anew in a surprising manner out of the entirely destroyed larval body.

It was in this memoir that the term "imaginal disks" (Imaginalscheiben) was first applied to those minute parts present in the larva from which the imaginal, head, thorax and appendages are formed. In 1866 appeared, in the same *Zeitschrift, Die Metamorphose der Corethra plumicornis,* in which its continuous development was contrasted with the discontinuous type represented by *Musca.* In the *Festschrift* for his teacher Henle, in 1882, were his *Beiträge zur Kenntniss der ersten Entwicklungsvorgänge im Insectenei.*

Another entomological topic to which Weismann directed his attention was the seasonal dimorphism of the Lepidoptera, not merely to solve that particular problem but also to take, as he hoped, a step forward in the question of the transformation of species. A paper of 94 pages on this subject in the *Annali* of the Genoa Museum for 1874 appeared also as the first of his *Studien zur Descendenz-Theorie* (Leipzig 1875).

The second (1876) of these *Studien* dealt with the origin of

the markings of Lepidopterous caterpillars (137 pages), and with the phyletic parallelism of metamorphic species (85 pages), discussing insects of different orders.

A short paper in the Zoologischer Anzeiger for 1878 treats of the scent-scales of butterflies.

Charles Sedgwick Minot was born in West Roxbury, Massachusetts, December 23, 1852. In his seventeenth year he was publishing descriptions of the male of *Hesperia metea* Scudder, of four new species of Geometridae and three new species of Phalaenidae, and discussing, but very briefly, the limits of genera, in the twelfth and thirteenth volumes of the *Proceedings of the Boston Society of Natural History,* and furnishing *Brief Notes on the Transformations of Several Species of Lepidoptera* [Heterocera] to the second volume of the *Canadian Entomologist.* In the following year (1870) some *Notes on the Flight of New England Butterflies* gave a classification of the characteristic manners of flight of different genera, briefly considered the influence of the size of the thorax and the shape of the wings in relation thereto, commented on the position of butterflies when at rest and as to where they spend the night (Proc. B. S. N. H., xiv, 55). In 1872 the *Canadian Entomologist* published his *Notes on Limochores bimacula.* In the same year came his graduation from the Massachusetts Institute of Technology (1872) and then a period of study (1873-6) in Leipzig, Paris and Würzburg. Here belong his *Recherches Histologiques sur les Trachées de l'Hydrophilus piceus* (Archives Physiol. Norm. Path., 2, iii, 1876), made in the histological laboratory of the College de France.

After his return to America, at the desire of Dr. A. S. Packard, Jr., he undertook a study of the anatomy and histology of various Orthoptera "in connection with the more directly practical labors of the U. S. Entomological Commission." The results appeared in the *First* and *Second Reports* of the Commission respectively, under the titles *Report on the Fine Anatomy of the Locust* (1878), and *Histology of the Locust (Caloptenus) and the Cricket (Anabrus)* with seven plates (1880).

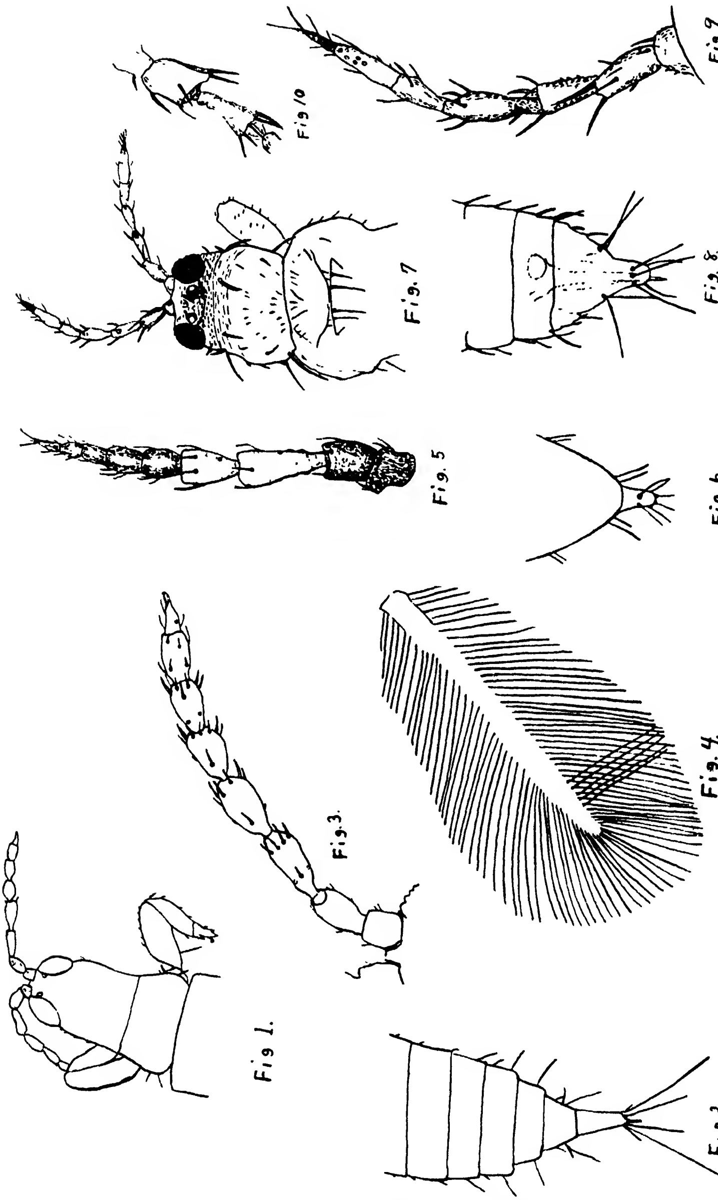
This latter was Dr. Minot's most important piece of entomological work, and we know of at least one laboratory in which it is still used as a guide and book of reference. A summary of some of these histological investigations saw the light also in *The American Naturalist* for June, 1878, as *A Lesson in Comparative Histology.*

To the Fourth Report of the Commission, in conjunction with Edward Burgess, he contributed an account of the *Anatomy of Aletia xylina* (1884), larva and imago, prepared at the request of Prof. C. V. Riley. A paper in German, *Zur Kenntniss der Insectenhaut* (Archiv. f. mikros. Anatomie 1886), also dealt with Lepidoptera, especially their larvae, and contains the interesting conclusion: "even a piece of cuticle suffices for the identification of the species."

This appears to have ended Dr. Minot's entomological career. He entered the service of Harvard Medical School, where he remained for the rest of his life, first as Lecturer on Embryology and Instructor in oral pathology and surgery (1880-3), then as Instructor in Histology and Embryology (1883-7), Assistant Professor (1887-92), Professor (1892-1906), and finally as Professor of Comparative Anatomy from 1906 to his death. His attention became chiefly directed to the Vertebrates, as the titles of his books show: *Human Embryology* (1892), *Bibliography of Vertebrate Embryology* (1893), *A Laboratory Textbook of Embryology* (1903), or to more general topics like *Age, Growth and Death* (1908), and *Modern Problems of Biology* (1913), the latter his lectures as exchange professor at the University of Jena in 1912. As an inventor of useful forms of automatic microtomes during this later, "vertebrate," period of his career, he aided entomological investigators quite as much as he helped others. From 1897 on he was President of the Boston Society which had published his earliest papers, and in 1901 President of the American Association for the Advancement of Science.

P. P. C.

The NEWS for December, 1914, was mailed at the Philadelphia Post Office November 30, 1914.



NEW THYSANOPTERA FROM FLORIDA—WATSON.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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New Thysanoptera from Florida.

By J. R. WATSON, Gainesville, Florida.

(Plate II)

The types of the new species here described are in the collection of the Florida Agricultural Experiment Station and cotypes will be placed in the U. S. National Museum.

Cryptothrips pini n. sp. (Pl. II, figs. 1-4).

General color very dark brown, almost jet black by reflected light.

♀. Total length 1.7 mm.; head 24 mm long, .16 mm in breadth; prothorax, length .14 mm., width .22 mm.; mesothorax, width .29 mm; abdomen, width .31 mm.; tube, length .12 mm., width at base 069 mm.; antennae: 1, 24.3; 2, 46.6; 3, 61.4; 4, 56; 5, 47; 6, 40; 7, 41; 8, 30; total length 373 microns.

Head one and one-half times as long as broad; cheeks slightly rounded and bearing a few very weak and short spines. *Eyes* reddish brown, slightly bulging; posterior ocelli situated far forward near the anterior ends of the eyes with the inner margins of which they are contiguous. *Mouth cone* large and rounded at the apex, reaching nearly to the posterior margin of the prothorax. *Antennae* eight-segmented, one and one-half times as long as the head; segments 1 and 2 dark brown, nearly as dark as the head; 3 brownish yellow, 4 varying from yellowish brown to light brown, 5-8 light brown; hairs weak and inconspicuous, a pair of heavy cones on segments 4 and 5.

Prothorax little more than half as long as head, one and one-half times as wide as long, sides diverging posteriorly; a rather weak spine on each posterior angle; no other conspicuous spines. *Mesothorax* nearly rectangular in outline but the sides slightly converging posteriorly, anterior angles very sharp. *Metathorax* with nearly parallel sides.

Legs slender, concolorous with the body, except the tarsi which are lighter, bearing a number of short but rather stout spines. Each femur has one long spine on the anterior margin one-fourth of the distance from the proximal end; posterior tibia with one rather long spine and a stout tooth on the anterior distal end; on the middle tibia the spine is less conspicuous and on the fore tibia both spine and tooth are still less conspicuous.

Wings nearly reaching the end of the abdomen; anterior pair noticeably constricted below the middle, fringed with long hairs which are nearly together towards the end of the wing, otherwise very evenly spaced; from three to six (usually five) hairs of a double row present. Hind wings very similar and nearly as large, but no constriction or double row of hairs.

Abdomen rather long, tapering gradually from about the third somite; first three somites entirely free of spines; from the fourth on there is a short spine about two-thirds of the distance along the margin which becomes progressively longer on the posterior somites, which also bear two or three shorter spines. *Tube* rather long, sides converging to one-half the width of the base at the apex.

♂. Similar to the female except for the weaker and especially narrower abdomen. Total length 1.23 mm. Most of the measurements are from seven to fifteen per cent. less than those of the female except segments 3-8 of the antennae.

Larvae.—The very young larvae are straw yellow in color, except the last three or four somites of the abdomen which are reddish brown and the antennae which are dark brown. As the larva becomes older the entire abdomen becomes reddish brown and the thorax develops brown blotches. The eyes are dark red.

Described from numerous females and several males and larvae.

Habitat.—Among the needles of pine trees, where they are quite common. Found on both young trees and large ones which had just been felled. Gainesville, Florida, January to April, 1914.

Heterothrips aesculi, n. sp. (Pl. II, figs. 5-6).

♀. Color very dark brown, black by reflected light. Total length, .9 to 1.0 mm.; head, .06 mm. long (exposed part), .15 mm. wide; pro-

thorax, .16 mm. long and .22 mm. wide; mesothorax, .26 mm. wide; abdomen, .14 mm. wide; antennae: 1, 23; 2, 38; 3, 72; 4, 41; 5, 30; 6, 28; 7, 15; 8, 17; 9, 19 microns.

Head as in *H. salicis* Shull, but the eyes are *dark reddish brown*, projecting prominently, spines between the facets very short. *Ocelli* yellow, posterior ones contiguous with the margins of the eyes, top-shaped with the pointed end directed posteriorly. *Mouth cone* as in *H. salicis. Antennae,* segments 1 and 2 *considerably lighter than the body,* apex of segment 2 nearly white, segment 3 yellow crossed by two white bands below the middle and with a white apex, segment 4 varying from nearly as yellow as 3 to nearly as brown as 5-9, always *lighter at the apex* than at the base, no circle of sensoria; segments 5-9 light brown; all segments, but especially 1 and 2, show transverse markings like the reticulations of the body; *articulations* between segments 3 and 4, 8 and 9, and sometimes 7 and 8 *clear,* others brown.

Prothorax as in *H. salicis* being about twice as long as head, sides strongly convex, beset with short spines which are more conspicuous at the angles. *Mesothorax* wider than metathorax.

Fore wings reaching to tip of abdomen, costal margin bearing about 30 spines, fore vein with about 26 and hind vein with about 18 spines.

Legs as in *H. arisaemae* Hood, femora concolorous with the body except the apical third of the fore pair which are concolorous with the fore tibiae, yellowish brown. Other tibiae brown but lighter on the apical third. Tarsi brownish yellow.

♂. .75 mm. long. Other measurements from 20 to 30 per cent. less than those of the female.

Described from numerous females and several males taken from the blossoms of *Aesculus pavia* at Gainesville, Florida, in March, 1914. This species is remarkably intermediate in many of its characters between *H. salicis* and *H. arisaemae,* particularly in the lengths of the antennal segments. It has the legs colored like the latter species, but on the whole is more closely related to *H. salicis,* from which it differs in the italicized characters.

Euthrips tritici var. **projectus** n. var. (Pl. II, figs. 7-10).

♀. Size, 1.00 to 1.25 mm. *Measurements* of head and thorax as in *E. tritici. Antennae*: Segment 1, 27; 2, 39; 3, 53; 4, 45; 5, 32; 6, 43; 7, 8; 8, 10 microns.

Color varying from clear straw yellow without a trace of orange except at tip of abdomen (found in blossoms of yellow composites) to a deep orange on thorax and abdomen; never brownish yellow. *Shape* and spines of head and thorax as in *E. tritici.*

Antennae: Segment 1 concolorous with the head, with a long but

slender curved spine on inner anterior angle. Segment 2 light brown, very long and the dorsal portion prolonged forward over the third segment and bearing two stout spines as in var. *bispinosus* Morgan; in side view this segment is triangular in outline. Segment 3, basal two-thirds white or gray, distal third light brown, carrying four good-sized spines as do all the other segments except 7; 4, basal half yellow, distal brown, 5 yellow, 6-8 dark brown. *Eyes* dark red, with 30-40 large facets.

♂. Similar in size to *E. tritici*. More inclined to be orange in color than the female. Differing from the species chiefly in the characters of the antennae. Segment 1, 20; 2, 34; 3, 24; 4, 37; 5, 30; 6, 40; 7, 7; 8, 9 microns. The most decided difference between this variety and the species is again found in the second segment of the antennae, which in the male, however, is markedly shorter than in the species while in the female it is longer. The projection of the second over the third segment is even more pronounced than in the female.

This variety is more closely related to var. *bispinosus* Morgan than to the species, but differs in the forward projection of the second segment and in its relative length. The spines on this segment are also different. The spines on the ventral side at the apex are much shorter than figured by Morgan and there is a stout spine near the base that he does not figure at all.

This is a very common type in Florida, being found in a great variety of blossoms, as orange, tomato, roses, begonia, numerous composites, and among the needles of tall pine trees.

Described from numerous females and males.

Cryptothrips floridensis.

The author has received what appears to be this same species from Mr. A. Rutherford, government entomologist of Ceylon. This greatly extends the range of this species. See ENTOMOLOGICAL NEWS, April, 1913.

EXPLANATION OF PLATE II.

Figs. 1-4. *Cryptothrips pini* n. sp. 1. Head and prothorax of female. 2. Posterior portion of abdomen of female. 3. Dorsal view of right antenna of female. 4. Fore wing.

Figs. 5-6. *Heterothrips aesculi* n. sp. 5. Head and thorax of female. 6. Tip of abdomen of female.

Figs. 7-10. *Euthrips tritici* var. *projectus* n. var. 7. Head and thorax of female. 8. End of abdomen of female. 9. Dorsal view of left antenna of female. 10. Side view of second and third segments of left antenna of male.

New Fragments on Some Well-known Insects (Col., Orth., Hem.).

By A. A. Girault, U. S. Nat. Mus., Washington, D. C.

The Method of Handling and Rearing Scarabaeidae of the Tropics.

The so-called white grubs of North America (larvae of *Lachnosterma* spp.) are well known to entomologists of the United States, and it is notorious that the larvae are exceedingly difficult to rear and that they require very careful handling in confinement. Indeed it may be stated that rather prolonged efforts have been made in some places to rear the insects both indoors and out, but without notable success. Recent experience with larvae of the same family (but of various genera) in North Queensland has inclined me to think that the failure to successfully handle them in North America was due rather to the spirit than to the substance, though I may be mistaken. The larvae I have in mind all feed upon the roots of various grasses and upon sugar cane. They do not differ in structure from those of *Lachnosterna* yet they are very hardy. For instance when obtaining material for the laboratory, we simply go out with a small satchel full of empty tin boxes (ordinary pipe tobacco boxes of the market) and dig around in various places with a small handpick: or else follow a plowman. The larvae obtained are placed into the boxes which are filled with soil and brought back. When convenient, say the next morning, they are transferred to pots, boxes and glasses filled with soils of various kinds and thus kept until maturity. Some remained in bare earth for months and throve, and they certainly extract nourishment from the soil like earthworms. Others are fed upon the roots of corn sprouted in the cages while others again are placed with decomposing vegetable matter upon which they thrive. Their growth is very rapid. Thus, merely handling them is impunitive. There is a big advantage, however. The life cycle is only about one year, and larval growth seems to occur the first three or four months following hatching, so that thereafter they can stand any amount of

starvation; as a matter of fact, the ground in North Queensland soon after the rainy season gets very dry so that the grubs retreat downward to surprising depths, out of reach of most roots.*

Periplaneta australasiae Fabricius in North Queensland.

Upon renting a private residence (and which had been formerly occupied by a family) in the little hamlet of Nelson, North Queensland, for a laboratory early in 1912, I found it in course of time to be badly infested with a cockroach which at first I thought must be a new form. It attracted especial attention because of the peculiar habit of depositing its egg cases against the walls, in cracks or behind objects such as books and coating over the sac with a layer of mud. I have never observed this before, nor remember having seen it recorded in the literature, and the fact at once became interesting. In a bookcase composed of wooden shelves, this roach was common, hiding behind the books and feeding upon the bindings, denuding in many cases all of the gold lettering on some of the bindings and in others giving an effect like that which would result from soaking in water. Upon first noticing the injury, in fact, I had almost unconsciously attributed it to rain having been allowed to beat through a transom, but upon removing some of the books, the presence of the insects was discovered; their excrement was very abundant between the books and the back of the shelf. The eggsac may be deposited upon the verandah or upon boxes on the ground beneath it. Two sacs taken on August 23 and 27, 1912, were separately kept in vials corked tightly and kept dry; each was completely covered over with a thin coating of reddish mud and measured between a half and three-quarters of an inch long; the sacs when uncovered have a characteristic satiny appearance, due

[*Some results of Mr. Girault's rearings of Australian Scarabaeidae are contained in his article "The Probable Best Method of Rearing Certain Scarabaeid larvae," Journal of Economic Entomology, VII, pp. 445-447. December, 1914.—Ed.]

to the shiny black color and fine longitudinal striation. Hatching occurred after several days, the young being characteristic in appearance. They are black with two adjacent white stripes across the middle of the body; closer inspection shows also that the femora are white and the sides of the prothorax while the two white stripes across the thorax are on the last two thoracic segments which are white, margined with black behind. Since no other roach is present, it is taken to be highly probable that these young and the sacs are *australasiae*. I do not remember ever having seen the sacs of woodland species coated over with mud, and this case appears to be altogether exceptional. Later, other egg cases not striated but opaque and reddish brown, similarly deposited but uncoated were found, and these appear to be *australasiae* since I obtained a similar sac from a female of that species in a hotel at Nelson.

Still later on May 2, I found a number of the sacs, some coated over with mud, some not; both the smooth and striated ones were found under both conditions. In a groove running down the center of a crosspiece on the door of a basement room in the laboratory, a sac of *australasiae* was found which was covered over (but only partly concealed) with minute bits of wood glued to the sac and which had been chewed from the sharp edges of the groove, as was plainly evident by the marks of the mandibles; the sac then resembles the surface of any wet or sticky object which has been sprinkled over with finely divided straw. The sacs, at least when coated with mud, are usually found against or upon the nests of muddaubers', so that resembling very closely one of the daubs of mud which these wasps use to cover over their cells, they are very well hidden indeed.*

The Occurrence of Cimex lectularius Linnaeus in Queensland.

On January 17, 1913, I found in the mattress of a bed in a hotel at Townsville, three specimens of a *Cimex* which upon comparison with specimens of *lectularius* from North America

* The sacs of *australasiae* have also been found to be deposited commonly into boxes of earth, to depths of one inch or more.

were seen to be identical. Since my arrival in Queensland late in 1911, this is the first time that this species has been met with, though my experience with all classes of hotels over the state (not to mention many coastal steamers) has been rather extensive (Brisbane, Roma, Mackay, Finch-Hatton, Townsville, Charters Towers, Ayr, Bowen, Proserpine, Lucinda Point, Ingham, Seymour, Halifax, Innisfail, Cairns, Nelson, Hambledon Junction, Babinda, Double Island, Herberton, Yungaburra, Malanda, Mareeba, Aloomba, Kuranda, Cooktown, Port Douglas, Mossman, Thursday Is., Cape River (farm house) and Hughenden). I have been to but one hotel in Brisbane, one in Mackay, but to about four or five in Townsville; in the former two places the hotels were of the first class while none of those in Townsville were poor, and only the few specimens met with were seen in the poorest of the four, the one which was cheapest, less well constructed, managed and so on and catering more to families than to transients. Thus, I have thus far met with the species only in large towns while the poorer hotels of the hamlets and settlements seemed to be free of them.

Miscellaneous Notes on Odonata.

By Mary B. Lyon,

With Comments on the Dimorphism of the Females of Ischnura verticalis,

By Philip P. Calvert.

Miscellaneous Notes on Odonata by Mary B. Lyon.*

In the course of an ecological study of the dragonfly nymphs of Cascadilla Creek, made at Cornell University in 1912-13, the results of which were published in the News for January, 1915, some observations on Odonata were made,

* Contribution from the Limnological Laboratory of the Department of Entomology, Cornell University.

which fell outside the scope of that work. These are here brought together and a description of the nymph of *Enallagma ebrium* Hagen is included.

I. A Note on the Emergence of Gomphines.

At the southern border of the Cornell University campus, a small stream known as Cascadilla Creek divides into two branches. After running through a grassy meadow these two branches again unite to form Dwyer's Pond. During the summer the upper third of one branch dries up, making a pond of the remainder of it. The other branch becomes a slow, sluggish stream. These quiet waters with their beds of soft mud and sand make an ideal home for the Gomphine nymphs which live there in great abundance. How great I did not realize until the morning of May 7, 1913, when the unusual number of birds along the banks attracted my attention as I came into the meadow. When I walked over to look I saw a great many Gomphine exuviae and closer examination showed many glistening wings among them. Along the banks of the stream and pond as far as six feet away from the water the ground was strewn with them. In a typical region I counted twenty-seven cast skins in a space only two feet square. Not a *Gomphus* was seen on the wing nor were any observed for several days afterward. The sandpipers, bronzed grackles, red-winged blackbirds, sparrows and probably other birds had enjoyed a sumptuous feast, as this was evidently the one morning of the season which hundreds of Gomphines had chosen for their emergence.

II. The Nymph of Enallagma ebrium Hagen. Notes and Description.

In addition to the dense population of burrowing nymphs in this part of Cascadilla Creek there is another one composed chiefly of damselfly nymphs, which inhabits the waterweeds. One of the most numerous species of this group is *Enallagma ebrium* Hagen. Some of these nymphs taken into the laboratory and reared in a cylindrical wire gauze cage (Needham

'99) emerged June 20. Imagos appeared in the field a few days later and were common until July 30, although by July 4 the season of transformation was practically over. As is the custom of other Enallagmas, the male usually accompanied the female during oviposition. I saw only one female descend beneath the surface of the water. She was deserted by the male, who hovered over the water in an agitated manner for ten minutes. He flew to the shore, but returned again to remain twenty minutes longer above the spot where she had disappeared. On July 16 a pair was copulating on the Alumni Field about an eighth of a mile from Cascadilla Creek, the nearest body of water from which they could have emerged.

*Description of Nymph.** (Plate I, fig. 3, text figs. 1-4).—The nymph of *Enallagma ebrium* Hagen appears more active than that of other species of *Enallagma.* Even at transformation time the color is such a clear green that the nymph looks as though it had recently molted, but a very slight pigmentation sometimes darkens the shade.

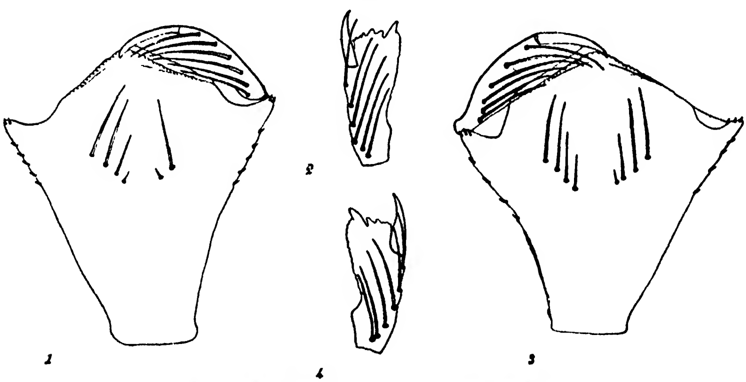

FIG. 1.—Labium showing the usual number of mental setae.
" 2.—Lateral lobe of labium shown in Fig. 1.
" 3 and 4.—Labium and lateral lobe showing the extra number of setae.

[*The nymph of *E. ebrium* has been described from a single specimen by Dr. E. M. Walker (Can. Ent. xlvi, p. 351, Oct., 1914) some months after the receipt of Miss Lyon's MS. by the NEWS. Since Miss Lyon had a greater number of individuals at hand in drawing up her description and has accompanied it with figures, we publish her account as received. Plate I was published in the January number of the NEWS.—ED.]

Labium with hinge halfway between first and second pairs of legs. Mental setae variable in number, usually four on one side, two on the other. Inner seta of the four reduced to a mere spinule, as in the corresponding one of the two, while the one next to it may be nearly one-third shorter than the normal. Labium occasionally with four mentals, two of which are reduced in size, especially on one side. Lateral setae six. Lateral lobe with three distinct teeth above the end hook, preceded by three minute teeth between which project two spinules. Femora with dark subapical rings. Tibiae with dark basal ring. Gills lanceolate; widest just beyond the middle, with blunt tips; proximal half of their ventral margins straight and strongly spinulose; the dorsal margin slightly convex, somewhat spinulose; distal margin bearing a few long hairs. Gills hyaline with four or five wide, dark, lacey bands formed by pigment covering the tracheal tubes.

Dimensions.——Body 12-13 mm.; gills 5.5 mm. additional.

III. The Supposed Dimorphic Female of Ischnura verticalis Say.

The dimorphism of the female of various species of *Ischnura* has been generally accepted, two forms having been described as the orange and black females of *Ischnura verticalis* Say in the keys of Calvert ('93), Williamson ('00), and others. According to Williamson, both become pruinose, the black female less so than the orange. He also notes that the pruinose orange females are more numerous in the spring than the bright orange or black ones, while the black females are most numerous in the autumn. Since it seemed probable that these three forms might be different stages in coloration due to age, some experiments were undertaken to determine their relationship if possible. The results have proved that there is but one female for *Ischnura verticalis* Say.

Apparatus.—The banks of Cascadilla Pond are straight and grass-grown. Into one of these banks a cut was made so that about ten inches of water might run into the bay thus formed. A simple cage was built to cover this bay together with a bit of the bank. The framework was made by crossing two pieces of heavy wire to form the diagonals of this rectangular space. The wires were bent at the corners so that when placed firmly in the ground they made a framework ten inches high. Over this support a covering of white mosquito netting

was stretched, and above that a layer of cheese-cloth. The edges of both were fastened by stones firmly to the ground on three sides, that of the fourth being held down by the weight of the water into which it extended. A natural habitat was thus secured with grass, water, plenty of room for flight, and sunlight a part of the day.

Experiment.

4 p. m., July 11. Eight orange females and four males of *Ischnura verticalis* Say which had emerged in the laboratory July 9 and 10 were placed in the cage. The length of the abdomen of the females was noticeably different and when measured was found to vary from 20.5 mm. to 23 mm., the hind wing varying in length correspondingly. Each day the grass was swept with an insect net, and when the damselflies were removed the catch was put into the cage to supply food. The females were examined daily and the colors noted. Two orange females died and one was drowned within the first four days.

4 p. m., July 17. One female showed the first indication of change, the bronze black of its abdomen beginning to look dull and velvety.

9 a. m., July 18. The female noted on July 17 was found dead in the water. Three orange females now remained. On one the black was dull and velvety and the under parts of the head and thorax were greenish.

3 p. m., July 19. Two females were entirely pruinose and agreed so closely with Williamson's description of the living black female that I can do no better than to quote it. "Bluish or grayish, pruinose; mid-dorsal thoracic and humeral stripes black; abdominal segments 1 to 7 with their apices darker, usually black, and 8 to 10 black." The marking on segment 8 was a black triangle covering the posterior half of the segment, with the base of the triangle at the apex of the segment. The face, sides of the thorax and under parts were greenish. The pterostigmata of all four wings were brown. When placed in alcohol this specimen agreed entirely with Williamson's description.

At this time, the remaining bright orange female was found mating.

9 a. m., July 20. The orange of the female which was seen mating on the previous afternoon had changed to dark brown on the thorax and head, but a little orange was still visible on the sides of segments 1 and 2. The remainder of the dorsum was dull grayish blue and there was a band on the apex of segments 1 to 7 and the posterior half of 8, while all of segments 9 and 10 were blackish. The face, sides of the thorax and the underparts were greenish yellow.

The two pruinose females were slightly darker in color, the apex of the blackish triangle on 8 having almost reached the basal border of the segment. These three individuals were placed in a smaller cage of wire gauze.

Six orange females which had emerged in the laboratory on July 19 and 20 were now placed in the large cage and no males included.

9 a. m., July 24. No change occurred until this date, when one orange female became slightly pruinose with a tinge of brown on the abdomen.

July 25. Two other females had become pruinose, and in time these and the one observed July 24 assumed a coloration like the one first described. No further change was noted in those which had been placed in the small cage except that they became more pruinose.

From these data we may conclude that the female of *Ischnura verticalis Say* varies somewhat in size and at the time of emergence is marked with bright orange on the postocular spots, the thorax and the first three segments of the abdomen. Four days or more after emergence, this orange turns to brown and then to a gray blue. At the same time the bronze black becomes bluish or blackish. The face, sides of the thorax and the underparts become yellowish green. This entire color change may take place in less than eighteen hours, and may occur either before or after mating. The rapidity with which the color changes occurred after mating in the

instance observed may account for the fact that no orange females have been seen ovipositing in the field. The fact that the pruinose orange female assumes with age the deeper coloration of the so-called black one, would naturally make this latter form far more numerous in the fall.

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THE DIMORPHISM OR DICHROMATISM OF THE FEMALES OF ISCHNURA VERTICALIS.

By PHILIP P. CALVERT, University of Pennsylvania, Philadelphia, Pa.

Of the authors who have written on the females of *Ischnura verticalis,* I believe that only Calvert (1893) and Williamson (1900), both in part only, Ris (1903) and Walker (1908) have correctly recognized the true dimorphism which exists in this sex *in individuals of the same age.* The two forms recognized by others are *not forms of equal age, but color differences due to age.* Miss Lyon, in her preceding paper, has shown that the orange female becomes pruinose and black, but I think that she has experimented with but one form of female to be found in this and other species of *Ischnura,* that which in treating of the genus, in the *Biologia Centrali-Americana,* I called the *heterochromatic* female, as being colored unlike the male.

The two true dimorphic or dichromatic forms are only to be recognized with certainty when the student has teneral, or relatively recently emerged, females before him. Their differences may be most concisely shown in a table:

DIFFERENTIAL CHARACTERS	HOMOEOCHROMATIC, "BLUE" OR "GREEN," ♀	HETEROCHROMATIC OR "ORANGE," ♀
Pale postocular spots.	Not confluent with the pale color of the rear of the head.	More or less confluent with the pale color of the rear of the head.
Predominant color on thorax.	Pale bluish.	Yellow or pale orange.
Blackish humeral stripe.	Wider than the pale antehumeral stripe.	Narrower than the pale antehumeral stripe.
Abdominal segment 1: Dorsum.	Dark metallic blue or green, only the articular membrane between 1 and 2 pale.	Yellow or orange with small black dots (four, two or one).
Sides	Pale bluish.	Yellow or orange.
Abdominal segment 2: Dorsum	Dark metallic blue or green for its entire length, narrowed at its hind end.	Yellow or orange with black markings varying from a narrow crescent at two-thirds of the segment's length to a spot on the first- and one on the third-third, connected by a fine mid-dorsal line.
Sides	Pale bluish.	Yellow or orange.
Abdominal segment 3: Dorsum	Dark metallic blue or green contracted at anterior end to a mid-dorsal line (thus forming what is usually described as a basal pale ring interrupted mid-dorsally) and at the hind end to a smaller degree.	Yellow or orange, the hindmost fourth dark metallic green prolonged forward as a tapering black line almost to, or to, the fore end of the segment.
Sides	Pale bluish.	Yellow or orange.

Both of these forms have, in their earliest imaginal state, ***the eighth and ninth abdominal segments pale blue,*** each segment ***with a lateral black stripe*** each side, extending from the fore end to two-thirds of the segment's length on 8, and to half-length of 9. The right and left lateral black stripes are connected with each other on each segment by a transverse black stripe at the fore end, which cross-stripe is distinctly wider (equal in some to even one-fourth of the segment's length) on 8 than on 9 (on the latter a little more than a line).

There is no constant difference in the size of these two females.

The homoeochromatic female from which I have chiefly drawn up this description appears, from its chitinization, to be more immature than the heterochromatic female which I employed. There is, therefore, no ground for supposing that the former is an older and in consequence a more blackened form of the latter. Judging from the material before me, both the homoeochromatic and the heterochromatic females above described, become darkened and eventually pruinose. One can, in some cases, determine whether a partly blackened female belonged originally to one or the other form by examining carefully those parts compared in the table on page 63 and recognizing their shape, size or tint under the partial concealment of the changing colors. Probably the pale blue on abdominal segments 8 and 9 disappears earlier in the heterochromatic females than in others.

A hint that occasionally an intermediate or a composite of the two forms exists is afforded by a well-chitinized female taken by myself at Delair, New Jersey, August 13, 1903. In most respects it agrees with our table for the homoeochromatic form, but differs therefrom in having the pale post-ocular spots confluent for about one-third of the width of each with the pale color of the rear of the head, the sides of abdominal segment 3 with an orange tinge which invades the dorsum in the anterior two-fifths of the segment, leaving only a narrow mid-dorsal black line on this part of the segment and two or three small isolated black spots on the sides, the posterior three-fifths of the dorsum being solidly metallic greenish-black.

Material examined in drawing up the preceding account:

Homoeochromatic Females.—Tinicum Is., Pennsylvania, June 22, 1889, 1 teneral; west side Schuylkill River below Gray's Ferry, Philadelphia, May 4, 1889, 1 teneral. Philadelphia, June 5, 1900, one specimen a little older. Philadelphia, May 22, 1904, 1 teneral. These four have abdominal segments 8 and 9 blue with lateral black stripes. Tinicum Is., May 21, 1904, one specimen with abdomen pruinose.

Heterochromatic Females.—Tinicum Is., Pa., June 22, 1892, 1 teneral; May 21, 1904, two specimens. Christiana Creek, Elkhart, Indiana, May 21, 1897, 1 teneral by R. J. Weith. Vermont, by Mrs. A. T. Slosson, 1 specimen. Only the Tinicum Is. specimens have 8 and 9 blue with lateral black stripes, but all five have yellow or orange distinct on head, thorax and first three abdominal segments.

Composite (?) *Female.*—The Delair female noted above.

The eleven specimens cited are in the collection at the Academy of Natural Sciences of Philadelphia. At different times I have given other specimens to Mr. E. B. Williamson and Prof. J. G. Needham.

Among my unpublished notes I find the following which I leave in their original form:

Teneral female *Ischnura verticalis* taken at pond, Botanical Garden, University of Pennsylvania, 8.55 A. M., May 13, 1904; able to fly, wings and body still quite flabby, colors pale but sufficiently well-marked to see that the 8th and 9th abdominal segments were pale with a black stripe on each side of each as in the male of this species. Placed in a "Lightning" pint jar whose top was covered with a piece of netting; contained a bit of twig for fly to crawl on.

Examined 3.30 P. M. same day; dark colors much more marked, pattern of 8 and 9 as before.

May 14, 9.45 A. M. Pattern as before, dark colors on body generally well-marked, black stripes on sides of 8 and 9 not reaching to apex of respective segments.

May 15, 12.30 P. M. Markings as on preceding record.

May 16, 12.30 P. M. No apparent change.

May 17, 9.15 A. M., do. May 18, 6 P. M., do. May 19, 6 P. M., do. May 20, 1.45 P. M., do. May 21, 3.45 P. M., do. May 22, A. M., dead, no change in the colors but still evidently teneral, no pruinosity.

Two teneral females of *Ischnura posita* collected same time [*i. e.*, May 13, 1904, etc.] and place. If anything, more teneral than *I. verticalis* ♀; did not show any trace of pale markings on dorsum of 8 and 9, *i. e.*, had practically pattern of adult. Three males, one female, teneral, *posita*, taken 10 A. M., May 14, 1904, likewise did not show any traces on 8-10 of a pattern different from that of the mature individuals.

It is probable that the teneral female of *I. verticalis* of May 13-22, 1904, is the homoeochromatic female cited above as of May 22, 1904, although it is merely labeled "Phila., May 22, 1904." Although it was kept alive in captivity for at least eight days, there is nothing in the notes to indicate that it was given any food and in this respect, and in its more limited range of movement, the experiment differed from those by Miss Lyon. These differences may account for the absence of color changes.

The authors who have described the females of *Ischnura verticalis* are the following:

Say (1839) described a "slightly pruinose" female, but it is not possible to determine whether it was of the homoeochromatic or heterochromatic form. In the original description, the signs ♂ and ♀ have evidently been transposed, as the content and the first line of the account of the true male indicate. LeConte (1859) in his edition has retained these signs and has made the error worse by altering the word "female" to "male" in the first line of the description of the true male.

Hagen (1861, page 76, under *A. ramburii*) very briefly described the heterochromatic female of such an age that "the whole of the abdominal dorsum" had become "brassy-fuscous" and a still more aged "pruinose" female which may have been originally homoeo- or heterochromatic.

Selys (1876) described an "adulte" and a "jeune" female, but there is nothing in the descriptions to indicate to which of the forms we have distinguished above they belonged.

Provancher (1876) translates Hagen's description of 1861 under the same name, *Agrion ramburii*.

Calvert (1893) distinguished a "black" and an "orange" female. Under the former heading he mentioned one as being "colored like ♂ (teneral)"; this is the homoeochromatic female of the present paper and some of the specimens on which this statement of 1893 was based are still before me. The other females referred to as "black" were said to have the "greater part of body *pruinose*," etc.; this would apply equally well to aged homoeochromatic, or to aged heterochromatic, females. The "orange" females of 1893 were evidently heterochromatic forms in which the blue of abdominal segments 8 and 9 had already been replaced by black.

Needham (1898) figured a heterochromatic female of the same degree of coloration.

The two females described by Kellicott (1899) are, following his order, "(b) orange and bronze black" = a heterochromatic female as described by Calvert (1893), and "(a) black and green (pruinose)" = an aged homoeo- or heterochromatic female.

Williamson (1900) recognized a "black" and an "orange" female. As the black females are said to have "postocular spots connected or not," it seems likely that they included advanced individuals of both the homoeochromatic (*i. e.*, postocular spots not connected) and the heterochromatic (*i. e.*, spots connected) forms. His orange females are evidently heterochromatic forms like those of Calvert (1893) and of Kellicott (1899), but he perceived and recorded that "this form becomes entirely pruinose."

Ris (1903) regarded the females as showing "a curious polymorphism." His expression "In some teneral females of the green form the upper side of segments 8 and 9 is largely blue" refers to homoeochromatic females of *verticalis* or of *kellicotti*, more probably the former. While he does not mention the earliest stage of heterochromatic females (*i. e.*, those with blue on abdominal segments 8 and 9), he recognizes the dimorphism (or dichromatism) of green and orange females, although his "fully adult" individuals of the latter are not the most fully altered in their colors.

Needham (1903, pl. 17, fig. 5) has reprinted his figure of 1898.

Two figures by Howard (1903, pl. xlvii, figs. 2, 4) seem to be referable to pruinose females of indeterminable form.

Walker (1908) briefly summarizes "two color varieties" of females, "the 'black female,' colored like the male when young," which implies our homoeochromatic form, and the "orange female," a heterochromatic form of unspecified age. He adds, "Both forms become pruinose when old, appearing then as though covered with a dull bluish dust . . . The latter [black female] seems to become pruinose very soon after maturity." The last-quoted sentence probably explains why so relatively few homoeochromatic females with blue on segments 8 and 9 have been recorded in the literature, and why the true characters and relations of this form have not been more largely recognized.

Muttkowski's descriptions of 1908 apply to the same conditions noted by Kellicott (1899).

If my interpretation of specimens and of descriptions be correct, I must assume one of three possibilities from Miss Lyon's work. 1. That she overlooked the presence of blue with the lateral black stripes on abdominal segments 8 and 9 of her youngest orange females, or 2, that the blue on these segments disappeared within 48 hours, or 3, that some orange

females never, at any time, possess this coloration on the two segments in question. The determination of the correctness of these assumptions affords a field for further observation and experiment. Those who undertake this should carefully note the colors of the living insects at frequent intervals with reference to some work like Ridgway's *Color Standards and Color Nomenclature.*

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Descriptions of New Genera and Species of the Dipterous Family Ephydridae.—II*

By E. T. CRESSON, JR., Academy of Natural Sciences, Philadelphia, Pa.

Dichaeta atriventris n. sp.

Similar to *caudata* Fall. but smaller (3.0 mm.) and the abdomen is entirely shining black, especially in the female, without any traces of grayish apices to the segments; the face is somewhat shorter in proportion.

Holotype.—♂, Colorado Springs, Colorado. Aug. 5915 ft. alt. (E. S. Tucker). [University of Kansas Collection.]

Paratype.—1 ♂, with same data.

This may be merely a variety of *caudata* but I have been unable to find any intergradents.

*Paper I. ENT. NEWS, xxv. 241, 1914.

Paralimna texana n. sp.

Similar to *P. appendiculata* Loew, but averaging lighter in general color on account of the non-coalescence of the brown irroration, especially of the mesonotum. The fourth vein lacks the appendages so distinctive of that species. Furthermore the fore femora of the male have the mesal flexor ciliation well developed, of curved flattened bristles, while the lateral series is complete nearly to the apex and is composed of numerous normal bristles arranged more or less irregularly towards the base. The fore femora and tibiae are slightly bent and their flexor surfaces more or less flattened. The wings are noticeably milky in well-preserved specimens. The females are difficult to separate from those of *appendiculata*, especially those from the southern localities. This may ultimately prove to be merely a subspecies of that species, but the characters noted above are of sufficient importance at present to warrant their use as a basis for a new species.

Holotype—♂, Austin, Texas, October 1900. [Washington State College Collection.]

Paratypes.—2 ♂, 5 ♀, with same data.

Hydrellia proclinata n. sp.

Black, subopake, obscurely metallic green; halteres lemon yellow. Frons opake black, with median area slightly greenish; lunule, face and cheeks densely bluish white. Mesonotum: scutellum much obscured by the thin brownish or hoary dust; pleura brownish with propleural and pteropleural hoary spots. Abdomen shining apically. Wings hyaline with black veins.

Head broader than high. Frons with strong mesofrontal bristles, including a pair of distinct proclinate pre-ocellars, also a strong proclinate orbital and a few setulae, the *usual reclinate orbital being absent.* Face 2.5 to 3 times as long as broad, nearly flat, very weakly carinate for its full length; 4-6 side bristles with a series of smaller ones nearer orbits. Cheeks equalling width of third antennal joint. Antennae short; third joint rather conical, as long as broad; arista thickened on basal half, with 5-7 hairs. Thorax and its chaetotaxy normal. Scutellum flat, truncate. Abdomen of male elongate with segment 5 as broad as long, truncate. Legs normal; hind femora with two series of setulae on lateral surfaces. Wings with second costal section 1.5 as long as third. Length, 1.75-2.75 mm.

Holotype.—♂, Berkeley Hills, Alameda Co., California, April 20, 1908 (Cresson). [Type No. 6075. A. N. S. P.]

Paratypes.—3 ♂, 5 ♀, with same data.

Differing from all known American species in having no reclinate frontal orbital bristles and in the face having two series

of facial bristles. The intensity of the pruinose coating of the mesonotum varies considerably, and the upper frontal orbital bristle is more or less developed but is always much smaller than the lower.

Parydra nitida sp. nov.

Black, similar in form to *P. bituberculata* Lw. Front polished with hardly any perceptible brown pollen, and of a more or less metallic color; face with lower part, clypeus, cheeks and occiput whitish pruinose. Metanotum also rather polished and nearly destitute of brown pollen, with the anterior portion of two median grayish vittae perceptible. Scutellum also polished, broadly rounded apically; the small apical tubercles not approximate and the lateral ones very small. Pleurae on lower part and pectus whitish pruinose. *Metanotum broadly polished medianly with the lateral angles distinctly pruinose, the respective areas sharply defined.* Abdomen rather shining metallic green, more or less faintly whitish. Legs black with tarsi only faintly rufous basally; the basal and apical silver spots of tibiae very distinct. Wings as in *P. bituberculata,* but cross-veins rather faintly clouded, and second vein ending beyond posterior cross-vein. Length 3.5-4.5 mm.

Holotype.—♂, Potlatch, Idaho. VI. 20. 1901. (J. M. Aldrich). [Type No. 6071, A. N. S. P.]

Paratypes.—2 ♂, 2 ♀, with same data.

The rather polished dorsal surfaces, the broad scutellum with the very small tubercles, and particularly the distinctively polished metanotum are the salient characters.

CIRRULA nov. gen.

In general appearance similar to *Ephydra.* Front broad, flat, slightly oblique but little depressed; vertical bristles weak, only two orbitals, near vertex; frontal plate extending forward beyond line of facial orbits, with a widely separated pair of proclinate converging setulae at anterior margin. Face in general projecting but more prominent at the medial hump between the distinct antennal foveae, in profile slightly concaved and retreating; evenly clothed with fine hairs; a tuft of very long down-curved bristles on the medial hump. Antennae short; second joint large, swollen; third rounded. Mesonotum nearly destitute of bristles except marginally; dorso-centrals represented by four short hair-like bristles hardly differentiated from the pile; acrostichals wanting; prescutellars

large; 1 humeral, 1 presutural small, 1 small supra-alar, 2 post-alars, 4 scutellars, 2 noto-, 1 meso-, 1 sterno-pleural present. Abdomen normal. Legs long, more or less characteristically developed in male; claws nearly straight; pulvilli wanting. Wings normal with post.c.v. straight but oblique.

A well-marked genus based on the tufted arrangement of the facial bristles which are not situated on the sides of the face as is usual with the Ephydridae, but are confined to a tuft on the hump between the antennae. Only one, the following species, is known.

Cirrula gigantea n. sp.

Black with yellow halteres; metallic-colored, mostly tawny to brown pruinose. Frontal plate shining, bluish-green, sparingly dusted with brown, with an elongate, narrow indentation just before the ocellar tubercle, clothed with short, appressed hairs; orbits very narrow, opake, brown pruinose with two orbitals in a series of fine setulae; frontalia distinct, opake, velvety brownish-black, much dilated anteriorly. Face opake, golden brown with a shining metallic spot between antennal foveae above; bristles as long as face; oral cilia few, long, laterally. Checks concolorous, about one-third the height of head. Antennae with third joint slightly longer than wide, conical; arista bare, except the thickened basal third pubescent.

Mesonotum shining, but more or less obscured by brown dust; an approximated anterior pair and a widely separated posterior pair of grayish stripes which are more or less opake in certain aspects. Scutellum concolorous, convex, with a few marginal hairs which are hooked at their ends. Pleurae below and metanotum grayish. Abdomen somewhat shining, glaucous green with long, hooked hairs apically; of male narrower than thorax, rather long, with seg. 2-4 subequal, 5 about one and one-half times as long as 4, triangular, rather acute apically; of female wider and shorter in proportion. Legs with anterior coxae silvery gray; all femora greenish-tinged and brownish, distinctly haired; male fore tarsi widely dilated and flattened, post-tibiae with an apical, lateral flexor tuft of long, hooked bristle-like hairs, its basal tarsus somewhat flattened and ciliate on lateral flexor margin, also evident on the next joint; extensor surface of post-tibiae narrowly polished. Wings brownish with costal sections 1 and 2 and veins 1 and 2 yellow. Length 7-9 mm.

Holotype.—♂, Cohasset, Mass. Sept. 8, 1904. [Type No. 6072. A. N. S. P.]

Paratypes.—3 ♀ with same data.

Scatella intermedia n. sp.

Black. Front twice as broad as long, shining, with a metallic green tinge and slightly gray pruinose. Face half as broad as vertex, as broad as long, protruding most at oral margin for about half the width of eye, entirely grayish or whitish with slight brown tinge above and laterally; 3 to 4 laterally-inclined bristles each side, the lowest of which is much longer than the next one, also a short ventrally-inclined bristle at lateral angle; setulae distinct and numerous; oral margin ciliate anteriorly. Cheeks half the width of antennae with distinct bristle. Third antennal joint slightly longer than broad, broadly rounded apically; arista twice the third, nearly bare.

Mesonotum somewhat shining, more or less obscured by brown dust which becomes more bluish-gray at margins; anterior d. c. and sutural acrostichals present; no postacrostichals. Scutellum concolorous, flat, apex rounded. Pleurae more grayish below; metanotum bluish gray. Halteres yellow. Abdomen elongate, shining, brown and gray pruinose; segment 4 of male one and one-half times as long as 3. Legs more or less brown and gray pruinose. Wings blackish-tinged, with five diluted spots of same arrangement as in *stagnalis* Fall.; costal sections 3 and 4 subequal; ultimate section of vein 4 slightly longer than preceding. Length 3 mm.

Holotype.—♂, Milbrae, Salt marsh, San Mateo Co., California. March 20, 1908. (Cresson). [Type No. 6073. A. N. S. P.]

Paratypes.—2 ♂, 2 ♀, with same data.

This may be *pentastigma* of Thomson, but only comparison of the types will make this certain. The wing spots are sometimes very faint. The gray coloration of the thorax and abdomen varies to some extent in its extensions. Belongs to the small group having both distinct anterior dorso-centrals and sutural acrostichal bristles present.

Scatella intermedia var. **obscuriceps** n. var.

Generally darker, with face dark brown or cinnamon-colored and wing spots more distinct.

Holotype.—♂, Swarthmore, Pennsylvania. April 18, 1909. (Cresson). [Type No. 6074. A. N. S. P.]

Paratype.—1 ♂, with same data.

I cannot consider this a distinct species although no intergradents have been seen.

Three New Species of Aphelinus (Hym.).

By E. W. Rust, Assistant Government Entomologist, Lima, Peru.

Aphelinus capitis sp. nov.

♀. Length, 0.75 mm.; expanse, 1.7 mm.; greatest width of fore-wing, 0.27 mm.

Antennal scape long and slender, reaching to top of head, slightly compressed laterally and of nearly equal cross section throughout its length except at the extremities where it tapers sharply to the articulations; pedicel just a trifle less than half as long as the scape and nearly half again as wide at its widest point, increasing gradually in diameter to a point just distad of its middle where it is half as wide as long; funicle joint 1 triangular in outline, *very* small and sometimes quite indistinct, being of less than half the size of funicle joint 2, which latter is of the same diameter as the pedicel and of a bit less than one-third its length; the penultimate joint is from two-thirds to four-fifths as long as the pedicel and just a shade wider, it is also three times as long as the second funicle joint which it just exceeds in diameter; the second or ultimate club joint, which is compressed laterally, is three times as long as the penultimate joint and at least one-third wider (when seen in broad outline), widest just distad of the middle from where it tapers rapidly to a blunt point. A deep constriction occurs between the two club joints separating them quite distinctly. Club, with a few longitudinal keels and (in common with the rest of the antenna) sparsely hairy.

Eyes hairy. Head and rest of body very similar to *A. diaspidis* How. both in shape, position and number of hairs or spines and in general sculpture, except that the mesoscutum and mesoscutellum of *A. capitis* are faintly longitudinally striated instead of showing the slightly tessellated pattern of *A. diaspidis*.

The forewings, in structure, are nearest like those of *A. mytilaspidis* How., but differ in that the discal cilia do not appear to be quite so plentiful as in the last named species. In *A. capitis* there is a greater difference in the length of the cilia on opposite sides of the hairless streak, those distad being seemingly shorter than in *A. mytilaspidis* and those proximad being slightly longer. The latter cilia, although of about the same numbers as those of *A. mytilaspidis*, more nearly occupy all of the wing surface proximad of the hairless streak, thus producing the impression that the wing is less densely ciliated than in *A. mytilaspidis*. Hind wings as in other species of *Aphelinus*.

Color: Head brownish yellow to orange yellow; eyes blackish except with strong light through them, when they appear garnet-colored; ocelli dark red; antennae concolorous with body or a trifle more

brownish; abdomen and thorax rather a dirty yellow which deepens in some places (notably on dorsal part of thorax) to a honey yellow or brownish yellow. Legs, very light yellow, often nearly white especially toward their extremities; forewings, with a distinct fuscous patch covering the proximal half, the fuscosity being especially pronounced around the stigma and at the proximal border of the patch of discal cilia, much as in *A. fuscipennis* How. Wing veins from honey yellow to almost hyaline.

♂. Unknown.

Described from twenty-five female specimens reared by P. H. Timberlake, of the U. S. Bureau of Entomology, as follows: from *Aspidiotus hederae* on Ivy (*Hedera helix*), Redlands, California, February 20, 1911, and February 26, 1912, and at Santa Barbara, California, November 8, 1911, and May 7, 1912; from *Chionaspis pinifoliae* on *Pinus radiata,* Santa Barbara, California; July 8, 1911, and July 15, 1911; from *Aspidiotus hederae* on oleander (*Nerium oleander*), Santa Barbara, California, April 21, 1911, and May 4, 1911; from *Aspidiotus camelliae* on oleander (*Nerium oleander*), Whittier, California, March 27, 1911; from *Aspidiotus* sp. on *Pinus radiata,* Santa Maria, California, August 4, 1911; from *Aulacaspis zaminae* on *Cycas revoluta,* Montecito, California, August 2, 1912. Also two female specimens reared by the writer from *Aspidiotus camelliae* on *Schinus molle*, Pasadena, California, July 28, 1911. Both glycerine and balsam mounts.

Type on slide labeled: *Aphelinus capitis.* Ex *Aspidiotus camelliae* Sign. on *Hedera helix* (Ivy). 14647 B. May 7, 1912. Santa Barbara, Cal. P. H. Timberlake.

The above species greatly resembles *Aphelinus diaspidis* How. in shape, size, arrangement of the hairs or spines on the body and the infuscation of the wings, but in coloration it more nearly approaches *Aphelinus mytilaspidis.* Also in the ciliation of the wings it resembles most closely *A. mytilaspidis.* However, the small size of the first funicle joint of the antennae at once differentiates this from any other species of *Aphelinus,* and together with the other differences pointed out above, render it a very distinct and unmistakable species. The hairy eyes are also rather exceptional in a species whose general color scheme is as light as that of the insect in question.

Aphelinus quaylei sp. nov.

♀. Length, 0.81 mm.; expanse, 1.41 mm.; greatest width of forewing, 0.21 mm.

Antennal scape long and slender, reaching to top of head, somewhat compressed laterally; pedicel one-third as long as scape and of same width as latter when the same is seen in broadest outline (*i. e.,* side view), increasing gradually in diameter from proximal to distal end; funicle joints taken together are just a shade more than half as long as the pedicel and of the same diameter as the latter at its widest point, first funicle joint slightly longer than the second and the division between these two joints oblique, as is also that between the second funicle joint and the penultimate club joint; the inner side of each funicle joint is longer than the outer side while the opposite is true of the penultimate club joint, thus making each of these three joints somewhat trapezoidal in outline; penultimate club joint about three-fourths as long as the pedicel and a trifle greater in diameter; last antennal joint more or less compressed laterally, at least three times as long as preceding joint (sometimes three and one-half times as long) and about one-third wider than the same (club seen in broad outline), of nearly equal cross section throughout its length, only tapering abruptly to a blunt point from a place very near the distal end. Club with a few longitudinal keels, the two joints being distinctly separated by a well-defined constriction. Antennae moderately hairy throughout.

Eyes faintly hairy. Head and rest of body most closely resembling that of *A. capitis* n. sp. described above, except that the abdomen is naked, or at most, bears a very few very inconspicuous hairs on the edges of one or two segments.

Wings densely ciliated, all cilia being unusually long. On the forewing the discal cilia proximad to the hairless streak are fully twice as long as the others and are arranged in four, or at most five rows.

Color: Head brownish yellow to orange yellow, sometimes with a pinkish cast; eyes, dark garnet red; ocelli, dark red; antennae, concolorous with rest of body which is of a lemon yellow throughout, sometimes deepening to canary yellow on the dorsum; wings hyaline except for a small, faint fuscous patch on the forewings in the clear space between the insertion of the wing and the first discal cilia. Wing veins from nearly hyaline to lemon-colored.

♂. Unknown.

Described from many female specimens reared by the writer at Lima, Peru, and throughout the Department of Piura, Peru, from *Pseudaonidia articulatus, Hemichionaspis minor* and *Aspidiotus camelliae* on various hosts. Also reared by P. H.

Timberlake, of the U. S. Bureau of Entomology, from *Chrysomphalus aurantii* and *Chrysomphalus aurantii citrinus* on citrus trees at Avondale, Walnut, Carpenteria and Whittier, California.

Type on slide labeled: 192° 3b.; *Aphelinus quaylei* ex. *Pseudaonidia articulatus* on *Ficus nitidis*. Lima, Peru. January 31, 1914.—E. W. Rust.

Named in honor of Prof. H. J. Quayle, who has so ably worked out the life history of this parasite; the account of which appears in Bulletin No. 222, California Agricultural Experiment Station, p. 131 (1911). At that time, however, the species was not recognized as being distinct from *A. diaspidis*, and it is under the latter name that the life history is given. The figure (Fig. 21) published therewith is evidently that of *A. diaspidis* and not of *A. quaylei*, to which it does not conform in either antennae, abdomen or wings.

Aphelinus limonus sp. nov.

♀. Length, 0.9 mm.; expanse, 1.55 mm.; greatest width of fore-wing, 0.23 mm.

Antennal scape rather long and slender, reaching nearly to top of head, somewhat compressed laterally; pedicel a trifle less than one-third as long as scape and of same diameter as the latter at its widest point, increasing slightly in diameter from proximal to distal extremity; funicle joints subequal, taken together they are about two-thirds as long as the pedicel and of about two-thirds the diameter of the same; penultimate club joint of same length as the two preceding joints taken together and of the same diameter as the pedicel; ultimate club joint somewhat compressed laterally, three times as long as the penultimate joint and about one-third greater in diameter at its thickest point; when seen in broad outline it presents one *slightly* curved edge while the other curves more sharply from near the center to the tip, causing the distal half of the club to resemble one horn of a rather blunt crescent. Club slightly longitudinally keeled, the two joints being distinctly separated by a well-defined articulation. Antennae very sparsely hairy.

Eyes naked. Head (especially the vertex) and dorsal part of thorax marked with a coarsely tessellated pattern which is generally quite well-defined. Abdomen naked, and rest of body much less hairy than is common in this genus.

Wing structure like that of *A. quaylei* n. sp. described above except that the discal cilia proximad to the hairless streak are, in certain cases, even *more* than twice as long as the others.

Color: Eyes, black; ocelli, dark red; rest of body of a uniform, semi-transparent, lemon yellow except that the antennae sometimes have a slightly deeper and more brownish cast; wings hyaline except for a slight lemon tinge to the veins.

♂. Unknown.

Described from fourteen female specimens received from E. M. Ehrhorn in a lot of *Hemichionaspis minor* on "pigeon-pea," which he sent to this office from Honolulu, Territory of Hawaii, in June, 1911. Balsam mounts.

Type, one of four on slide labeled: 1" 3r. *Aphelinus limonus* ex. *Hemichionaspis minor* on pigeon-pea. Honolulu, T. H. VI-5-1911. E. M. E. The type specimen lies closest to the slide-label.

This species very closely resembles *A. quaylei* n. sp. and the following points will be of especial use in separating them.

Aphelinus quaylei.	*Aphelinus limonus.*
1 Smaller than *A. limonus.*	1 Larger than *A. quaylei.*
2 Slightly more deeply colored than *A. limonus.*	2 Slightly lighter than *A. quaylei.*
3 Head yellowish brown or brownish orange.	3 Head lemon-colored.
4 Dorsum of thorax striated.	4 Dorsum of thorax tessellated.
5 Forewings with a slight fuscous patch at insertion.	5 Wings hyaline.
6 Eyes slightly hairy.	6 Eyes naked.
7 Eyes dark garnet red.	7 Eyes black.
8 Funicle joints fairly large, closely joined and rather trapezoidal in outline.	8 Funicle joints smaller, regular, bead-shaped and well-separated.
9 Club rather slender and abruptly pointed.	9 Club stouter and having a longer curve to the point.
	Discal cilia of wings extremely long, often seeming even longer than those of *A. quaylei.*

All types to be deposited in the United States National Museum at Washington, D. C.

Experiments in Destroying Fruit Infested with Fruit Fly Maggots (Dipt.).

By HENRY H. P. SEVERIN, PH.D.

Various methods for the destruction of fruit infested with fruit fly maggots have been recommended by entomologists. In Bermuda, according to Harris (4) some of the fruits infested with Mediterranean fruit fly larvae (*Ceratitis capitata* Wied.) "were collected in sacks, weighted by inserting a big stone before closing the bag, and thrown into the sea." Herrera (5) gives an account of destroying the Mexican or Morelos orange worm (*Anastrepha ludens* Loew) by injecting gasoline or benzine into each fallen, infested fruit, thus avoiding the transportation of heavy loads of oranges to the incinerator or burying ditches.

The daily destruction of all infested fruit by burning, boiling or burying has been recommended by a large number of entomologists. Since the daily burning or boiling of maggoty fruit "is not always a convenient method," as French (1) has already pointed out, and we may add somewhat expensive on account of the fuel consumed, we endeavored to test out the cheaper methods of destroying infested fruit.

A considerable difference of opinion exists among entomologists as to the depth that maggoty fruit should be buried in the soil to prevent the adult flies from emerging. In Mexico, the Commission of Parasitologia Agricola formulated rules to control the Mexican or Morelos orange worm and recommended that infested fruit should be covered with about twenty inches of soil. Froggatt (2).

In 1898 a fruit fly regulation was put into force in Queensland and one method recommended for the control of fruit flies was to bury infested fruit "beneath not less than one foot six inches of solid earth." Kirk (6).

Mally (7), of South Africa, found that, if infested fruit was placed in the bottom of a pit and covered with ten inches of soil, the Mediterranean fruit flies emerged in abundance in due time, but if the soil was carefully tramped, no flies succeeded in escaping.

French (1), of Victoria, recommends "an open trench about three feet deep in which the fruit should be buried and a covering of earth rammed down."

Newman (8), of Western Australia, believes that "two feet of soil, well pressed down, will destroy all the maggots."

Gurney (3), of New South Wales, writes: "Burying fly infested fruit cannot be advocated. Pupae buried 6, 8 and 12 inches below the surface of the soil hatched, and adult flies readily made their way to the surface in all cases."

Van Dine (10), formerly stationed at the Hawaiian Agricultural Experiment Station, recommends that all melons and vines infested with the melon fly maggots (*Dacus cucurbitae* Coq.) should be collected at intervals of five or six days and covered with earth to a depth of several inches.

Channels in moistened sand made by melon flies (*Dacus cucurbitae* Coq.) after emerging from the puparia. The black areas represent flies which died in their attempt to burrow through the sand.

A number of experiments were performed to determine the distance that the Mediterranean fruit flies and melon flies, after issuing from the puparia, were able to burrow through sand and soil.

In the first experiment, several hundred melon fly puparia were placed on two inches of dry, sterilized sand at the bottom of a cylindrical jar (24x11½ inches) and this jar was then filled with more of the same kind of sand. A similar vessel, half filled with dry sand, was then inverted over the top of the above mentioned jar. This was done by placing a heavy glass plate over the mouth of the jar to be turned upside down, inverting the same above the other vessel and then pulling the glass plate out from be-

tween the two jars. A similar experiment was conducted with wet sand which had been previously sterilized. The puparia in both experiments were arranged in a circle close to the wall of the jars so that when the flies emerged and burrowed through the sand their paths might be seen. When the melon flies emerged, many would bore up to the regions where the jars came in contact with one another and then escaped through the small spaces between the jars. These small spaces were due to particles of sand which rested on the rims of the jars. One could scarcely believe that these large flies were able to flatten their bodies to such an extent as to squeeze through such small spaces as existed between the jars.

It was evident that some of the melon flies were not able to burrow as far as others, for many died at the upper end of the channels before obtaining their liberty. (See figure.) Flies would frequently bore into an excavation made by other specimens, and if the union of the channels would form a circular path, some of the individuals would continue to burrow slowly round and round, and finally die in this endless passage. Usually, however, most of the flies showed a definite orientation and bored more or less directly upward. This negative reaction to gravity is common with many insects after emerging from the egg or pupa.

As there was a possibility that the flies might have been hindered by being against the glass, holes two, three and four feet deep were drilled in hard soil with a fence-post borer. At the bottom of these holes from 100 to 1000 Mediterranean fruit fly or melon fly puparia were placed. The puparia were then covered with sterilized dry or wet sand or soil. After these pits were filled each hole was covered at the surface with a large, mouthed jar which rested tightly against the solid earth. The following table shows the number of Mediterranean fruit flies and melon flies which succeeded in boring through two, three and four feet of sand or soil:

TABLE I.

NUMBER OF *Ceratitis capitata* OR *Dacus cucurbitae* WHICH BURROWED THROUGH TWO, THREE AND FOUR FEET OF SAND OR SOIL.

	Ceratitis capitata			*Dacus cucurbitae*	
Number of feet puparia were buried...	2	3	4	2	3
Number of puparia buried in each hole	100	100	1000	500	500
Number of flies that bored through dry sand	44	7	1	34	2
Number of flies that bored through wet sand	14	0	0	8	0
Number of flies that bored through soil..	0	0	0	5	0

It is evident from this table that a larger number of both species of Trypetidae were able to bore through dry sand than wet sand, and that very few flies succeeded in making their way through the more lumpy soil.

Lime, which is often thrown into the garbage-can to destroy the larvae of the house fly and blue bottle fly, would probably destroy the fruit fly maggots if it was buried in sufficient quantity with the infested fruit and vegetables, but this method would increase the cost.

As a means of destroying the maggots of *Ceratitis* in fruit, Penzig (9) recommends submerging "it for a short space of time in water."

Gurney (3) submerged Mediterranean fruit fly maggots in sea water "for periods varying from 6 to 45 hours" and in each case a large percentage of the maggots developed into adult flies.

In an experiment, melon fly maggots were submerged in fresh water for a period varying from two to four days, in order to determine whether such larvae would pupate and give rise to flies. Larvae were selected which had bored out of a pumpkin and were ready to pupate. These maggots were submerged in seven inches of distilled water which was renewed daily. After remaining in the water for two, three or four days the larvae were transferred to filter paper and after pupation the puparia were placed in moist sand in a breeding jar. The following table indicates the results obtained:

TABLE II.

NUMBER OF MELON FLY LARVAE WHICH PUPATED AND ISSUED AS ADULT FLIES. THE LARVAE BEING SUBMERGED IN SEVEN INCHES OF WATER FOR A PERIOD OF TWO TO FOUR DAYS.

Number of larvae	*Days submerged in water*	*Number pupated*	*Number of dead pupae*	*Adults reared*
100	2	75	28	47
100	3	16	11	5
100	4	0	0	0

Oranges which were infested with the larvae of the Mediterranean fruit fly were thrown into a barrel containing water, while other oranges were cut in half before throwing them into the barrel. A day later many of the smaller maggots were found floating on the surface of the water while some of the larger maggots extended out stiffly from holes in the peel of those oranges which had not been cut. Some of these larger maggots were placed upon moist filter paper in a dish, and most of the larvae became active within several hours. Traces of life in a small per cent. of the maggots could be found after the infested fruit had remained in water for three days. After the fruit had been in the barrel of water for a period of four days, the contents were dumped into a half dozen boxes and covered with several inches of soil. No Mediterranean fruit flies, however, emerged. Undoubtedly certain chemicals could be added to the water, which would destroy the fruit fly maggots in the infested fruit in less time, but this again, would increase the cost.

CONCLUSION.

Burying infested fruit in over three feet of loose soil would require a considerable amount of labor. If Mally's (7) method of burying fruit beneath ten inches of soil carefully tramped will prevent the fruit flies from escaping, it will not only prove to be one of the cheapest and most practical methods of destroying infested fruit, but it will also be a means of adding a valuable fertilizer to the soil. Submerging fruit in water for

a period of four days would be quite effective, provided the infested fruit is collected daily and submerged in water. The two last methods, however, could be advantageously combined. Infested fruit could be collected daily and thrown into a barrel or tank of water, and when a sufficient amount has accumulated the maggoty fruit could be buried. This would do away with the daily plowing or digging of trenches, filling in and tramping of the soil. In large orchards, however, the daily gathering of infested fruit would be rather expensive on account of the labor.

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The Seventieth Birthday of Prof. Metschnikoff.

Science for Dec. 25, 1914, calls attention to the fact that Prof. Elias Metschnikoff (or Elie Metchnikoff), "the eminent Russian pathologist, who for the last twenty-six years has been engaged in research at the Pasteur Institute in Paris, will be seventy years old next" May and states that a *Festschrift* for him has been in preparation. It should not be forgotten that in earlier years Metschnikoff published important papers on the embryology of scorpions (1871), of chilognathous myriopods (1874, 1875), of Hemiptera and other insects (1866).

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., FEBRUARY, 1915.

Selection of Papers for Scientific Meetings.

As is shown on other pages of this issue, there were ninety-six papers on entomological topics presented at the Convocation Week meetings in Philadelphia between Monday noon and Friday noon. A few of these were given simultaneously before different societies. Seventy-one papers were listed on the program of the American Society of Zoologists, to be delivered between 9 a. m. Tuesday and noon on Thursday. Fifty-seven titles appeared on that of the American Phytopathological Society, to begin on Wednesday at 9.30 a. m. and to end at some indefinite hour on Friday.

What was the result? The non-appearance of some authors shortened the sessions. Some entomologists who were present and intended to read their contributions asked, when their names were called, that their papers be read by title only. The Zoologists found it necessary, on their third day, to divide into two sections holding sessions at the same time. Everywhere communications were necessarily reduced to a minimum and full discussion was hampered by the ever-present sense of the lack of time. That a mental dyspepsia accompanied this feeling is self-evident.

It is idle to think of increasing the number of days for meetings. The remedy must be sought in some curtailment of the number of papers presented. In this way alone is the most valuable feature—full discussion—to be preserved. Curtailment can only be obtained by selection of a few out of the many. Presumably this choice must be made by executive committees of the organizations concerned. In many cases selection will be in favor of the older and better known men to the exclusion of the rising, younger membership, who should be encouraged. Difficult problems will thus be created, but there seems to be nothing else to do but to face them and solve them on the selection basis, although in some cases the issues will be evaded by a greater segregation of the societies in place and time.

Thus does the Advancement of Science and the increase in specialization thwart us, driving us into narrower limits whether we will or no.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Change of Address.

A. A. Girault *to* U. S. National Museum, Washington, D. C., U. S. A.

Entomologists in the War.

E. E. Austen, the dipterist, K. G. Blair, coleopterist, and N. D. Riley, lepidopterist, all of the British Museum of Natural History, are said to be at the front. (*Science*, Jan. 1, 1915).

Identification of Specimens.

The following specialists will determine material in their respective groups, from North America, unless otherwise noted. Those whose names are preceded by * should be communicated with before sending specimens, as their time for such work is limited, or they are interested only in special groups or genera. See the NEWS for January, 1915, pages 33 and 35, for directions for sending specimens.

DIPTERA.—*Chironomidae* and *Mycetophilidae*: O. A. Johannsen, Cornell Univ., Ithaca, N. Y.; *Empididae*: A. L. Melander, Pullman, Wash.; *Syrphidae*: A. L. Lovett, Corvallis, Oreg.; *Acalyptratae*, especially *Ephydridae*: E. T. Cresson, Jr.; *Leptidae*: M. D. Leonard, Dept. of Entom., Cornell Univ., Ithaca, N. Y.

HEMIPTERA.—*Jassidae*: E. D. Ball, Logan, Utah; *Aphididae* (Material in this family should be provided with complete data on food plants, correct scientific names of same, date and location of capture): C. P. Gillette, Fort Collins, Colo.; H. F. Wilson, Corvallis, Oreg.; Edith M. Patch, Orono, Maine; *Psyllidae* (see note under *Aphididae*): Edith M. Patch, Orono, Maine; *Aleyrodidae*: J. R. Watson, Gainesville, Fla.; *Coccidae*: *J. G. Sanders, Madison, Wis.; *Chionaspis, Hemichionaspis* and *Phenacaspis* of the world: R. A. Cooley, Bozeman, Mont.

HYMENOPTERA.—*Tenthredinidae* and *Uroceridae*: *A. D. MacGillivray, 603 W. Michigan Avenue, Urbana, Ill.; *Aphidiinae* and *Ophiinae*: A. B. Gahan, College Park, Md.; *Chalcidoidea*: A. A. Girault, U. S. Nat. Mus., Washington, D. C.; *Megastigmus*: C. R. Crosby, Cornell Univ., Ithaca, N. Y.; *Sphecidae*: H. T. Fernald, Amherst, Mass.; *Apoidea*: E. G. Titus, Logan, Utah; from Nebraska, Myron H. Schwenk, Lincoln, Neb

MALLOPHAGA AND ANOPLURA.—*V. L. Kellogg, Stanford Univ., Cal.

NEUROPTERA.—W. E. Hinds, Auburn, Ala.

ORTHOPTERA.—*J. A. G. Rehn, Acad. Natural Sciences, Phila., Pa.

LEPIDOPTERA.—*Rhopalocera*: Henry Skinner, Acad. Natural Sciences, Philadelphia, Pa.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record. Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

2—Transactions of the American Entomological Society, Philadelphia. **4**—The Canadian Entomologist. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **18**—Ottawa Naturalist. **50**—Proceedings of the U. S. National Museum. **102**—Proceedings of the Entomological Society of Washington. **180**—Annals of the Entomological Society of America. **195**—Bulletin of the Museum of Comparative Zoology, Cambridge. **198**—Biological Bulletin of the Marine Biological Laboratory, Woods Hole. **220**—New Jersey Agricultural Experiment Station, New Brunswick. **226**—Transactions, Academy of Sciences of St. Louis. **322**—Journal of Morphology, Philadelphia. **413**—Report of the State Entomologist of Minnesota, St. Anthony Park. **447**—Journal of Agricultural Research, Washington. **490**—The Journal of Parasitology, Urbana, Illinois. **491**—Transactions of the American Microscopical Society, Decatur, Illinois. **494**—Proceedings of the Royal Institution of Great Britain, London. **495**—Massachusetts Agricultural Experiment Station, Amherst.

GENERAL SUBJECT. Cassino, S. E.—The Naturalist's Directory. (Salem, Mass., 1914). 199 pp. **Cooley, R. A.**—Killing small arthropods with the legs extended, **490,** i, 105. **Criddle, N.**—Annual meeting of the Entomological Society of Ontario, 1914. Some personal impressions, **18,** xxviii, 126-7. **Headlee, T. J.**—Report of the entomological department for 1913, **220,** 789 pp. **Herrick, G. W.**—Insects injurious to the household and annoying to man, (The Macmillan Company, 1914), 470 pp. **Howard, L. O.**—Report of the entomologist of the U. S. Department of Agriculture (Ann. Rpt. Dpt. Agric., 1914), 16 pp. **St. John, W.**—Formaldehyde useful in setting insects, **9,** 1914, 325-6. **Slingerland & Crosby**—Manual of fruit insects (The Macmillan Company, 1914), 503 pp.

PHYSIOLOGY AND EMBRYOLOGY. **McClung, C. E.**—A comparative study of the Chromosomes in orthopteran spermatogenesis, **322,** xxv, 651-730. **Payne, F.**—Chromosomal variations and the formation of the first spermatocyte chromosomes in the European earwig, Forficula sp., **322,** xxv, 559-86. **Turner, C. H.**—An experimental study of the auditory powers of the giant silkworm moths (Saturniidae), **198,** xxvii, 325-32.

ARACHNIDA, ETC. **Craig, C. F.**—New varieties and species of malarial plasmodia, **490,** i, 85-94. **Todd, J. L.**—Tick paralysis, **490,** i, 55-64.

NEUROPTERA, ETC. **Ellis, M. M.**—An Acanthosporid gregarine from No. Am. dragonfly nymphs, **491,** xxxiii, 215-22. **Whedon, A. D.**—Preliminary notes on the Odonata of Southern Minnesota, **413,** xv, 77-103.

ORTHOPTERA. **Rehn & Hebard**—A synopsis of the species of the genus Neoconocephalus found in America north of Mexico, **2,** xl, 365-413.

LEPIDOPTERA. **Busck & Boving**—On Mnemonica auricyanea, **102,** xvi, 151-63. **Kephart, C. F.**—The poison glands of the larvae of the brown-tail moth. (Euproctis chrysorrhoea), **490,** i, 95-103. **Rau, P. & N.**—Longevity in Saturniid moths and its relation to the function of reproduction, **226,** xxiii, 1-78. **Tsou, Y. H.**—Homology of the body setae of some lepidopterous larvae, **491,** xxxiii, 223-60. **Walker, J. J.**—Buddleia and butterflies; an American note, **8,** 1914, 289-90.

Busck, A.—Descriptions of new micro L. of forest trees. [10 new sps.]; Life history of Eucosma haracana, **102,** xvi, 143-50; 150. **Gibson, A.**—A new Elachistid moth from Manitoba, **4,** 1914, 423-4.

DIPTERA. **Back & Pemberton**—Life history of the melon-fly (Bactrocera cucurbitae), **447,** iii, 269-74. **Hudson, H. F.**—Lucilia sericata attacking a live calf, **4,** 1914, 416. **Severin & Hartung**—The ravages, life history, weights of stages, natural enemies and methods of control of Dacus cucurbitae, **180,** vii, 177-212. **Shannon, R. C.**—Habits of some Tachinidae, **102,** xvi, 182. **Smulyan, M. T.**—The marguerite fly (Phytomyza chrysanthemi), **495,** Bul. 157.

Dietz, W. G.—The Hebes group of the dipterous genus Tipula [8 new], **2,** xl, 345-63. **Malloch, J. R.**—Notes on the dipterous genus Chyromyia. [2 new sps.], **102,** xvi, 179-81. **Parker, R. R.**—A new Sarcophagid scavenger from Montana, **4,** 1914, 417-23. **Thomas, F. L.**—Three new species of Trypetidae from Colorado, **4,** 1914, 425-29. **Tothill, J. D.**—List of Tachinidae from the Prov-

ince of Quebec, **18**, xxviii, 113-16. **Walton, W. R.**—Report on some parasitic and predaceous D. from northeastern New Mexico. [3 new species, 2 new genera], **50**, xlviii, 171-86.

COLEOPTERA. **Boving, A.**—Notes on the larva of Hydroscapha and some other aquatic larvae from Arizona, **102**, xvi, 169-74. **Browne, F. B.**—The life-history of a water-beetle, **494**, xx, 754-64. **Duporte, E. M.**—The wavy striped flea-beetle. (Phyllotreta sinuata), **4**, 1914, 433-5. **Palmer, M. A.**—Some notes on life history of lady-beetles, **180**, vii, 213-38.

Hopkins, A. D.—List of generic names and their type-species in the coleopterous superfamily Scolytoidea, **50**, xlviii, 115-36. **Schwarz, E. A.**—Aquatic beetles, especially Hydroscapha, in hot springs in Arizona, **102**, xvi, 163-8. **Schwarz & Barber**—Note on Rhipidandri—a correction, **102**, xvi, 175-77. **Wickham, H. F.**—New Miocene C. from Florissant. [many new], **195**, lviii, 423-94.

HYMENOPTERA. **Tower, D. G.**—Note on the number of spiracles in mature chalcid larvae, **180**, vii, 248-9.

Cockerell, T. D. A.—Bees visiting Helianthus [2 new species], **4**, 1914, 409-16. **Gahan, A. B.**—Descriptions of n. gen. and sps., with notes on parasitic H. [12 new species, 2 new genera], **50**, xlviii, 155-168. A new sp. of Cheiloneurus with a key to the described species from the U. S. [C. amplicornis n. sp.], **180**, vii, 247-8. **Marcovitch, S.**—A species of Megastigmus reared from larch seeds. [M. larias n. sp.], **4**, 1914, 435-8.

SOME SOUTH INDIAN INSECTS AND OTHER ANIMALS OF IMPORTANCE CONSIDERED ESPECIALLY FROM AN ECONOMIC POINT OF VIEW. By T. BAINBRIGGE FLETCHER, R.N., F.L.S., F.E.S., F.Z.S., Imperial Entomologist to the Government of India (late Government Entomologist, Madras). Madras, India. Price 6 rupees (about $2.25).

The author says the book does not pretend to do more than provide a narrow and tortuous entrance into the vast and almost untrodden field of Insect Life in India. As far as it is possible to give an insight into the insects of India, especially those of economic importance, in 546 pages, the work is a success. It is rather profusely illustrated, having fifty plates in color and four hundred and forty text figures. This book is an example of what is taking place in the Tropics in the way of the study of insect life. Economic entomology is making rapid strides in the warm countries and its value to man is being recognized very generally. The following lines, quoted from the preface, are rapidly losing their significance:

"To that part of Science folks style entomology
Really demanded some sort of apology."

The author says that seven-tenths of the population of India are entirely dependent upon their crops whose produce is always lessened

and sometimes wholly destroyed by the ravages of insects. The book is remarkably well-planned and covers the whole field, including Household Pests, Insects and Disease, Beneficial Insects, Insecticidal Methods, etc. There are also interesting chapters on subjects not usually incorporated into such works, such as, Means of Defence in Insects; Communication Among Insects; Tropisms; Symbiosis and Parasitism; The Balance of Life.

We consider this one of the best books ever published on the subject and a credit to the author and the Government of Madras. We have foregone the pleasure of looking for or finding a typographical error or some slight mistake, which probably makes the review incomplete, but the good is there in great abundance.—H. S. (*Advt.*)

INSECTS INJURIOUS TO THE HOUSEHOLD. By GLENN W. HERRICK, Professor of Economic Entomology in the New York State College of Agriculture at Cornell University. The Macmillan Company, New York. Price, $1.75. 470 pages and 152 illustrations.

If one judges from the requests for information that come to scientific institutions, a work of this kind is urgently needed. Very few householders, if any, escape insect pests of one kind or another and up-to-date, authoritative information will now be available to the public. While the work is not intended as a treatise on insects in relation to disease, there are admirable chapters on some of these pests. A valuable feature of the book is the bibliography following each chapter. Each of the seventeen chapters deals with a group of insects having related activities. This is illustrated by the chapters on insects injurious to clothes and carpets; ants and their activities and invasions of the household. We consider this one of the most useful of the recent books on economic entomology or its subdivisions.—H. S. (*Advertisement.*)

MANUAL OF FRUIT INSECTS. By the late MARK VERNON SLINGERLAND and CYRUS RICHARD CROSBY. The Macmillan Company, New York. Price, $2.00.

The junior author states that the book in part is the result of nearly twenty years' work by Professor Slingerland in studying the insect problems of the fruit-growers of New York State. The more important insect pests of deciduous trees are treated and minor pests altogether omitted. The means of control are given from the standpoint of the commercial fruit-grower. Most of the illustrations are from photographs by Professor Slingerland. There are 492 pages, 396 illustrations and an index of the names of the insects treated. The fruit insects make a rather compact group and lend themselves very well to special treatment. There are professional growers who would find such a work valuable to them and it will also appeal to the suburbanite who has fruit trees around his home. The illustrations are generally satisfactory and in some cases excellent. Some of them lend themselves better to half-tone illustration than others Prof. Slingerland was an expert on insect photography. The junior author has accomplished a valuable piece of work in bringing to light these researches of Prof. Slingerland.—H. S. (*Advt.*)

Doings of Societies.

THE CONVOCATION WEEK MEETINGS.

The American Association of Economic Entomologists and the Entomological Society of America held their annual meetings in Philadelphia between December 28th, 1914, and January 1, 1915, as announced in the NEWS for December, 1914, pages 469-470, except that the closing session of the former occurred in the morning, instead of the evening, of December 31. One hundred were in attendance at the Tuesday afternoon session of the Economic Entomologists, seventy-five at the Thursday afternoon and fifty-six at the Friday morning sessions of the Entomological Society. These are probably not the maximum figures. Fifty-seven papers were listed on the programs of the Economic Entomologists, twenty-seven on that of the Entomological Society. Ten papers relating to insects were included in the list of the joint meetings of the American Society of Zoologists and Section F (Zoology) of the American Association for the Advancement of Science. Two others of entomological bearing were presented elsewhere. The total of 96 exceeds those of 85 and 74 for the corresponding societies in 1912 and 1913 respectively. The proceedings of these societies will be duly published elsewhere, but it will be of some interest to our readers to present here the titles of the papers, grouped according to subject. Those unmarked are from the program of the Economic Entomologists, those starred (*) from that of the Entomological Society; others are designated by abbreviations of the respective societies' names.

GENERAL SUBJECTS.—H. T. FERNALD, Amherst, Mass., Annual Address of the President. Some Present Needs of Economic Entomology.—STEPHEN ALFRED FORBES, University of Illinois, Ecological Foundations of Applied Entomology.*—HENRY SKINNER, Academy of Natural Sciences, A History of the Entomological Society of America.*—W. E. BRITTON, New Haven, Conn., The Academic Training of the Entomologists in Colleges and Experiment Stations of the United States.—V. E. SHELFORD, Urbana, Ill., Suggestions as to the Original Habitat and Distribution of Various Native Insect Pests.—CHARLES

H. T. Townsend, U. S. National Museum, On Proper Generic Concepts.*—Nathan Banks, U. S. Bureau of Entomology, Suggestions for Discovering Affinity and Phylogeny.*—C. P. Gillette, Colorado Agricultural College, Insect Notes from Colorado.*—A. D. MacGillivray, University of Illinois, The Modification of the Subcostal Vein in the Wings of Insects.*

CYTOLOGY.—F. Payne, Indiana University, A Study of the Maturation Period in the American and European Molecrickets (Amer. Soc. Zool.).—Robert Chambers, Jr., Cincinnati University, Microdissection Studies on the Physical Properties and Behavior of Cell Structures, Especially in Orthopteran Spermatogenesis (Amer. Soc. Zool.).—Mary T. Harman, Kansas State Agricultural College, Spermatogenesis in Paratettix (Amer. Soc. Zool.).—D. H. Wenrich, Harvard University, Synapsis and the Individuality of the Chromosomes (Amer. Soc. Zool.).

PHYSIOLOGY.—George A. Dean and R. K. Nabours, Manhattan, Kans., A New Air Conditioning Apparatus (an illustrated description of the air conditioning machine and breeding chamber).—A. F. Conradi, Clemson College, S. C., The Moisture Factor in Relation to Insects (a brief presentation of the moisture temperature relation in insect activity).—N. E. McIndoo, Bureau of Entomology, The Reflex "Bleeding" of the Coccinellid Beetle, Epilachna borealis (Amer. Soc. Zool.); The Olfactory Sense of Coleoptera.*—V. E. Shelford, University of Illinois, Modification of Tiger-beetle Colors by Temperature and Moisture;* Modification of the Color Patterns of Cicindela by Temperature and Moisture.*—E. Newton Harvey, Princeton University, Studies on the Phosphorescent Substance of the Fire-fly (Amer. Soc. Zool.).—Wm. L. Dolley, Jr., Randolph Macon College, Reactions to Light in Vanessa antiopa, with Special Reference to Circus Movements (Amer. Soc. Zool.).

GENETICS.—E. Carleton MacDowell, Carnegie Institution, Bristle Inheritance in Drosophila (Amer. Soc. Zool.).—Robert K. Nabours, Kansas Agricultural College, The Behavior of a Unit Character in the Grouse Locust, Paratettix (Amer. Soc. Zool.).—A. Franklin Shull, University of Michigan, Parthenogenesis and Sex in Anthothrips verbasci (Amer. Soc. Zool.).—T. H. Morgan, A. H. Sturtevant, C. B. Bridges and H. Muller, Columbia University, Demonstration of the Four Hereditary Groups and the Four Pairs of Chromosomes of Drosophila (Amer. Soc. Zool.).

INSECTS INJURIOUS TO PLANTS.—C. G. Hewitt, Ottawa, Can., The Brown-tail Moth in Canada (the introduction and present status of the insect in Canada, with an account of the preventive and eradicative measures).—C. H. Hadley, Jr., Durham, N. H., Contact

Sprays for Brown-tail Caterpillars (result of spraying young brown-tail caterpillars in the spring with various contact sprays of different strengths).—E. A. McGregor, Batesburg, S. C., *Tenuipalpus bioculatus* McG., A Serious Pest to Privet Hedges (description of pest's work with notes on life history, habits and methods of control).—E. P. Felt, Albany, N. Y., Fumigation for the Box Leaf Miner (a summary of the effects of various fumigants upon both plant and insect).—V. I. Safro, Louisville, Ky., The Nicotine Sulphate-Bordeaux Combination.—P. J. Parrott and W. J. Schoene, Geneva, N. Y., Insecticidal Properties of Various Sulphides and Polysulphides (results of experiments with insecticides containing sulphides and polysulphides of sodium, potassium, calcium, and barium as regards effectiveness against various injurious insects).—W. M. Scott, Baltimore, Md., A New Contact Insecticide (results of experiments in the use of a dry barium sulphur compound as compared with lime-sulphur solution for the control of the San José scale and the oyster-shell scale).—J. W. McCulloch, Manhattan, Kans., Recent Results in the Use of Dust Sprays for Controlling the Corn-Ear Worm.—L. Haseman, Columbia, Mo., The Corn-Ear Worm and Its Control.—George A. Dean, Manhattan, Kans., Further Use of Poisoned Bran Mash Flavored with Fruit Juice for Controlling Insects (Effectiveness of this bait in controlling army worms invading fields and gardens; also in controlling variegated cutworms, black crickets, and grasshoppers).—E. P. Felt, Albany, N. Y., Grasshopper Control in New York State.—W. C. O'Kane, Durham, N. H., Arsenical Residues on Fruit and Grass (Summary of further experiments to determine the residues on fruit, foliage and grass after spraying with arsenate of lead, and the possible danger of poisoning human beings or livestock).—H. H. P. Severin and H. C. Severin, Marietta, Ohio, Kerosene Traps as a Means of Checking up the Effectiveness of a Poisoned Bait Spray to Control the Mediterranean Fruit-Fly (*Ceratitis capitata* Wied.) with a Record of Beneficial Insects Captured in the Kerosene.—L. Haseman, Columbia, Mo., The Work of the Cotton Worms and Moth in Missouri (Work of the pest on cotton and injury to fruit; also notes on development of the pest and control measures).—H. B. Scammell, Pemberton, N. J., The Cranberry Root Worm (History, distribution, life history and habits, with recommendations for control).—W. M. Scott, Baltimore, Md., Arsenate of Lime as an Insecticide (Report on the use of arsenate of lime as a substitute for arsenate of lead in the control of the codling moth and certain shade tree insects).—H. A. Surface, Harrisburg, Pa., [illegible]ds, Semi-Frauds and Questionables (Brief discussion on the difficulties met by an economic zoologist in combating materials of more questionable value, recommended as insecticides).—W. W.

YOTHERS, Orlando, Fla., Spraying Scheme for the Control of Insect Pests (Approximate dates to spray to produce best results).—H. J. QUAYLE, Riverside, Cal., The Citricola Scale (*Coccus citricola*) (A summary account of the insect from the economic viewpoint).—P. J. PARROTT, Geneva, N. Y., An Analysis of Spraying Methods against the Codling Moth (Brief discussion of preliminary experiments on eastern and western methods of spraying and of some factors that should be considered in the employment of a driving spray in commercial apple orchards in New York).—E. G. TITUS, Logan, Utah, Apple Leaf Roller in Utah (Brief résumé of experimental work carried on against this insect during the present season).—GLENN W. HERRICK, Ithaca, N. Y., Further Data on the Control of the Fruit-Tree Leaf-Roller (*Archips argyrospila*).—P. W. GLENN, Urbana, Ill. The Apple Flea Weevil (*Orchestes canus*) (General account of occurrence in Illinois. Life history, habits and methods of control).—E. N. CORY, College Park, Md., Preliminary Report on the Woolly Aphis (Report of control measures investigated).—A. F. CONRADI, Clemson College, S. C., Results of Wire-Worm Investigations (Life history and control of the wire-worms, *Horistonotus uhleri* and *Monocrepidius vespertinus* in South Carolina).—WILMON NEWELL, College Station, Tex., Notes on Insects Attacking Sudan Grass (Information concerning well-known insects attacking Sudan grass, an important forage crop of the semi-arid Southwest).—S. J. HUNTER, Lawrence, Kans., Some Economic Results of the Year.—W. R. McCONNELL, Hagerstown, Md., An Unique Type of Insect Injury (An account of an insect which prevents the proper functioning of the root-nodules of certain legumes).—C. L. METCALF, Columbus, Ohio, A Mechanical Measure for Controlling the Flea-Beetle (*Epitrix fuscula*) on Potato.—J. R. PARKER, Bozeman, Mont., An Outbreak of the Alfalfa Looper (*Autographa gamma californica* Speyer).—A. I. BOURNE, Notes on Onion Maggot in 1914 (Brief notes on work of present season's progress in the scout for practical methods of control).—H. H. P. SEVERIN and H. C. SEVERIN, Marietta, Ohio, Life History, Natural Enemies and the Poisoned Bait Spray as a Method of Control of the Imported Onion Fly (*Pegomya cepetorum* Meade), with Notes on Other Onion Pests.—E. G. TITUS, Logan, Utah, Insects of the Year in Utah (Principal insects causing damage this year noted on account of unusual character of some outbreaks).—C. W. CARPENTER, A Method of Excluding Mites from Pure Cultures (Amer. Phytopath. Soc.).—Also the following papers from the program of the American Association of Official Horticultural Inspectors (Section of Horticultural Inspection of the Association of Economic Entomologists): E. R. SASSCER, Fed. Hort. Board, Washington, D. C., Important Insect Pests Collected on Imported Nursery Stock in 1914.—H. B.

WEISS, New Brunswick, N. J., Some Recent Insect Importations into New Jersey.—Informal Discussion of Question 1. Should further importation of all nursery stock be prohibited by Federal law, except in very limited amount for experimental propagation by the U. S. Dept. of Agriculture?—Informal Discussion of Questions 2 and 3: 2. What is the proper treatment for scale-infested premises in close proximity to nurseries? 3. Should we require fumigation of all susceptible nursery stock grown in states known to be generally infested with San José scale?—A. W. MORRILL, Phoenix, Ariz. (a) Standardized Inspection Certificates, and (b) Should Living Plants be Excluded from the Mails? —L. HASEMAN, Columbia, Mo., The Missouri Inspection Service.—R. KENT BEATTIE, Fed. Hort. Board, Houston, Tex., The Training of a Nursery Inspector.—Informal Discussion of Questions 4 and 5: 4. By what means can the standard of efficiency of inspectors be raised? 5. Should horticultural inspectors furnish a bond?—T. J. HEADLEE, New Brunswick, N. J., Essentials in Insect Control (A plea for greater simplicity).—J. G. SANDERS, Madison, Wis., A Model Nursery and Orchard Inspection Law (Progress report), with General Discussion led by WM. PITKIN, Rochester, N. Y., Chairman of Committee on Legislation of the National Association of Nurserymen.

INSECTS INJURIOUS TO MAN.—T. J. HEADLEE, New Brunswick, N. J., The Problems Involved in the Practical Work of Controlling the Mosquito Pest within the Limits of a County (a brief statement of the problems and methods of meeting them. Based on two years' experience with such work).—R. A. COOLEY, Bozeman, Mont., A Review of the Spotted Fever Tick in Montana.—F. C. BISHOPP, Dallas, Texas, Flies which Cause Myiasis in Animals (Some aspects of the problem).—JAMES ZETEK, Entomologist, Republic Panama, The Ecology of Plague* .—SILER, J. F., GARRISON, P. E., and MACNEAL, W. J., New York, Recent Studies of Pellagra (Soc. Amer. Bacter.).

APICULTURE.—WILMON NEWELL, College Station, Tex., Address by the Chairman—Five-minute talks on apiary inspection work and foul brood situation in different states by apiary inspectors.—E. F. PHILLIPS, Washington, D. C., Distribution of American Foul Brood and European Foul Brood in the United States.—W. E. BRITTON, New Haven, Conn., A Simple Record System for Apiary Inspection.—BURTON F. GATES, Amherst, Mass., Inspection as a Unit in the Massachusetts Apicultural Service.

NEUROPTERA.—NATHAN BANKS, U. S. Bureau of Entomology, Geographical Distribution of Neuropteroid Insects, together with an Analysis of our Insect Fauna.*

COLEOPTERA.—A. G. RUGGLES, St. Paul, Minn., The Life History of Oberea ulmicola (?).

HYMENOPTERA.—J. W. MCCULLOCH, Manhattan, Kan., Further

Data on the Life Economy of the Chinch Bug Egg Parasite (Results of the life history studies of the past summer).—H. A. SURFACE, Harrisburg, Pa., Efficiency of Parasites of the San José Scale (An outline on the efficiency of parasites in cleaning up this pest; their natural spread in Pennsylvania, and their successful dissemination by artificial means).

LEPIDOPTERA.—C. P. GILLETTE, Colorado Agricultural College, Interpretation of the Codling Moth Data from Colorado.*—L. HASEMAN, University of Missouri, Life-history, Development, and Work of Unspotted Tentiform Leaf-miner of Apple.*—EDNA MOSHER, University of Illinois, Pupal Characters Used in the Classification of the Sphingidae.*—CORNELIA F. KEPHART, Cornell University, The Poison Glands of *Automeris io,* Fabr.*—PAUL S. WELCH, Kansas Agricultural College, The Biology of *Nymphula maculalis* Clemens.*

HEMIPTERA.—C. P. GILLETTE, Fort Collins, Col., Notes on Plant Lice having Alternate Food Habits; Food Habits of Some Colorado Aphids.*—R. A. COOLEY, Montana Agricultural College, A Photographic Record of the Development of the Female *Lepidosaphes ulmi* Linn.*—W. D. FUNKHOUSER, Ithaca High School, Notes on the Life-histories of certain Membracidae.*—H. OSBORN, Ohio State University, On the Life-histories of Cercopidae and Jassidae.*—MORTIMER D. LEONARD, Cornell University, Notes on Capsid Life-histories.*—C. R. CROSBY, Cornell University, An Insect Enemy of the Four-lined Leaf-bug.*—ANNA GRACE NEWELL, University of Illinois, The Homology of the Genitalia of *Benacus griseus.**

DIPTERA.—J. M. ALDRICH, U. S. Bureau of Entomology, Results of Twenty-five Years Collecting in the Tachinidae;* The Habits of Sarcophagidae.—FREDERICK KNAB, U. S. National Museum, The Nemocera not a Natural Group of Diptera.*—ALVAH PETERSON, University of Illinois, Studies on the Morphology of the Head and Mouth-parts of Diptera.*

OBITUARY.

JOHN MUIR, the widely-known mountaineer and Californian naturalist, died suddenly of pneumonia, at the California Hospital, in Los Angeles, on December 24, 1914, at the age of nearly 77 years. His books, especially *The Mountains of California, Our National Parks, My First Summer in the Sierra,* will always be read and valued by the Californian naturalists. Two species of Lepidoptera were named in his honor by Henry Edwards in 1881; a pretty little noctuid moth, *Gyros muirii,* from Tuolumne County, and *Thecla muirii,* from Mendocino County. After describing the latter butterfly,

Henry Edwards says: "I have named this exquisite little species after my friend John Muir, so well known for his researches into the geology of the Sierra Nevada, who has frequently added rare and interesting species to my collection." A chapter on The Bee Pastures of California is of interest to the entomologist. Muir was President of the Sierra Club, Fellow of the A. A. A. S., and member of other societies.

Muir Lodge, in the San Gabriel Mountains, north of Los Angeles, is a memorial to him by the Southern California Section of the Sierra Club, which insect collectors will frequently pass in the years to come. With the late Joseph Le Conte, John Muir was known and loved by a larger number of people than any other Californian naturalist.

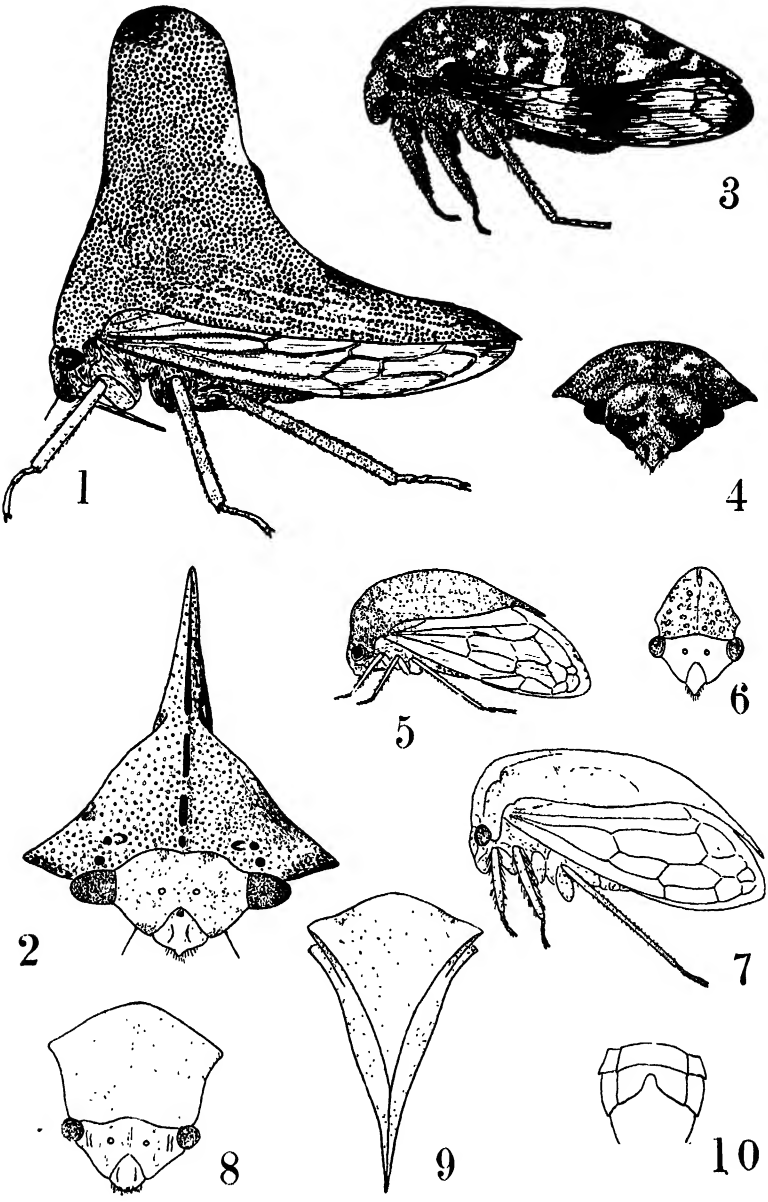
FORDYCE GRINNELL, JR.

WILLIAM WARREN, English Lepidopterist, known especially for his work on the Geometridae, died at Tring, October 18, 1914. He was born in Cambridge in 1839, subsequently graduated at the University there, taught at the Doncaster Grammar School and later "relinquished the calling of schoolmaster altogether and went in for Entomology pure and simple." He was a most active and vigorous field worker to the end of his life. A brief obituary notice in the *Entomologist's Monthly Magazine* for December, 1914, has supplied the above information.

DR. DANIEL ELMER SALMON died recently at Butte, Montana. He was born at Mount Olive, Morris County, New Jersey, July 23, 1850, and studied veterinary medicine at Cornell University. He entered the service of the U. S. Department of Agriculture in 1879 and was chief of the Bureau of Animal Industry 1884-1906. In 1907 he became director of the Government Veterinary School at Montevideo, Uruguay. He was joint author, with Dr. C. W. Stiles, of *Cattle Ticks (Ixodoidea) of the United States,* a work of 111 pages and 25 plates, published in the Annual Report of the Bureau of Animal Industry for 1902.

ERRATUM.

P. 28, this volume, "Table II", last figure in second column should be 3 instead of 6.



NEW MEMBRACIDAE—FUNKHOUSER.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXVI. MARCH, 1915. No. 3.

CONTENTS:

New Membracidae from the United States (Hemip., Homop.).

By W. D. FUNKHOUSER.

(Contribution from the Entomological Laboratory of Cornell University.)

(Plate III)

1. **Telamona alta** sp. nov. (Plate III, Figs. 1 and 2.)

This species bears the highest crest of any *Telamona* hitherto described. The crest is erect and tongue-like, suggesting the forms of Butler's genus *Glossonotus,* but is placed well behind the humeral angles. The species should be easily recognized by the high crest and prominent humeral angles.

Ferruginous brown mottled with black. Pronotum bearing compressed dorsal crest twice as high as wide; apex rounded. Humeral angles produced.

Head yellowish-brown, finely punctate, punctures yellow at base of head, black at apex, lorae roughly sculptured; base of head broadly sinuate; ocelli yellow, nearer to each other than to the eyes; eyes

deep brown, wider than high; clypeus with deep longitudinal fossa on each side of median ridge, depressed circular pit at base.

Pronotum finely punctured with brown and black, not pubescent; two black circular spots and a U-shaped depression above each eye; humeral angles prominent, triangular, extending beyond the eye to a distance equal to the width of the latter; percurrent median carina alternately black and white before crest; crest twice as high as wide, arising behind lateral angles, straight and erect, much compressed, anterior margin almost straight, slightly sloping at base, apex rounded, posterior margin slightly step-like in middle with white spot above step, margin irregularly marked with shining brown, sides of crest roughly black-punctured, giving the whole a dark appearance; posterior process slightly ridged, tectiform, gradually acute, extending just beyond tips of tegmina.

Tegmina hyaline, about half-concealed by the pronotum, tips fuscous, base and costal area lightly punctate, veins prominent with punctured borders.

Under surface of body yellowish with white pubescence. Legs ferruginous; pulvilli bright red.

Type—Female. Length, 10.5 mm.; width between tips of humeral angles, 7 mm.; height from lateral margin of pronotum to tip of dorsal crest, 7 mm.

Locality: Spring Creek, Georgia. Collected by the author July 20, 1912.

2. **Carynota maculata** sp. nov. (Plate III, Figs. 3 and 4.)

Size a little smaller than *C. mera* Say to which it seems most nearly related, but differs from that species in color, in form of body and in shape of pronotum. Should be recognized by the black color with yellow markings, the low anterior pronotum, the flattened dorsum, and the very prominent swellings at the base of the head.

Dorsum not laterally compressed; rounded before and flattened above. Wings with apical areas sessile, their bases truncate. Color black with irregular markings of orange yellow.

Head convex, slightly wider than long, yellowish mottled with black, roughly sculptured, finely punctate, sparsely pubescent; two large subglobular protuberances on front of head, one on each side of median line at base; ocelli situated meso-cephalad of protuberances and nearer to each other than to the eyes; eyes brown and not prominent; clypeus small, pilose.

Pronotum black with irregular patches of yellow, densely and finely punctate; very low in front, flattened on dorsum, somewhat swollen

behind middle; faint percurrent median ridge; humeral angles blunt and rounded; posterior process thick and tectiform, almost reaching apex of tegmina.

Tegmina smoky hyaline, brown and punctate at base, a brown patch in middle and at tip; veins prominent and slightly raised. There is a variation in the cross-veins, one specimen having two cross-veins between media and cubitus while the type specimen shows but one.

Under surface of body yellow; sides of meso- and metathorax black; sheath of ovipositor ferruginous. Legs shining black-brown with fine yellow pubescence; apex of posterior tibiae slightly ferruginous.

Type—Female. Length, 8.5 mm.; width, 4.5 mm.

Type locality: Jacksonville, Florida.

Described from specimens collected by Mr. L. H. Weld at Jacksonville, Fla., April 14, 1914, and at Gainesville, Fla., April 23, 1914.

I am indebted to Mr. Harold Morrison for these specimens which he very kindly gave me from his own collection.

3. **Stictocephala minuta** sp. nov. (Plate III, Figs. 5 and 6.)

This is probably the smallest North American species of this genus. It may be recognized by the small size, by the characteristic milky spots and lines on the pronotum, and by the fact that the humeral angles do not project outward as far as the eyes.

Uniform yellow with milk-white spots and lines. Thickly and densely punctate, sparingly pilose. Pronotum arcuate. Posterior process slender and somewhat fuscous. Eyes prominent. Tegmina and wings entirely hyaline.

Head orange-yellow, translucent, smooth, slightly marked with greenish-white; clypeus extending for half its length beyond line of lorae, pilose; ocelli white with border of brilliant red, somewhat nearer to each other than to the eyes; eyes large, prominent, extending beyond humeral angles, brown with red borders.

Pronotum compressed; narrow and convex in front; densely punctate; mottled in front with irregular white spots sometimes slightly tinged with green; humeral angles rounded, only slightly produced; median percurrent carina almost obsolete in front; dorsum compressed, sides of pronotum marked with two white lines; posterior process suddenly acuminate, narrow, sharp, extending beyond internal angle of tegmina.

Tegmina hyaline, very slightly punctate at base, extreme apical border faintly fuscous.

Under surface of body yellow, abdomen compressed laterally. Legs yellow; front tarsi and claws slightly ferruginous; apices of hind tibiae with very small black spines.

Type—Male. Length, to tip of abdomen, 3.4 mm.; to apex of tegmina, 5.2 mm. Width between humeral angles, 1.8 mm.

Locality: Spring Creek, Georgia.

Described from one specimen collected by the author July 22, 1912.

4. **Ceresa occidentalis** sp. nov. (Plate III, Figs. 7, 8, 9 and 10.)

Near *C. brevitylus* Van Duzee, but more robust, suprahumerals shorter and blunter, and without the black markings on pectoral sclerites or femora. May be recognized by the low, broad pronotum, the blunt, rounded clypeus, and the very convex metopidium.

Bright green, becoming yellowish in cabinet specimens. Form robust, metopidium convex, suprahumeral horns short and stout, posterior process slender and decurved, clypeus rounded. Punctate but not pubescent.

Head yellow-green, roughly sculptured, longitudinal striae near eyes, very finely punctate; clypeus rounded at apex, continuing lateral margins of lorae, a longitudinal impression near each lateral angle, tip densely pilose with white hairs; ocelli translucent with orange borders, situated slightly below a line drawn through center of eyes, almost equidistant from each other and from the eyes; eyes brown, extending beyond sides of pronotum but not as far as tips of humeral angles.

Pronotum green, densely and coarsely punctate, not pubescent; ascending nearly straight above head, convex between suprahumeral horns, feebly arcuate in middle, dorsum somewhat flattened, semicircular impression not prominent; median carina percurrent; humeral horns short and blunt, extending almost directly outward and at tips slightly backward, not at all upward; front of pronotum having long, transverse, smooth, irregularly-shaped areas dorso-mesad of eyes, these areas yellowish and shining; posterior process long, slender, sharp, much decurved, reaching beyond tip of abdomen and more than half way from internal angle to tip of tegmen.

Tegmina clear hyaline; lightly punctate at base, veins greenish. Under surface of body yellow; last ventral segment of female broad and deeply, roundly notched; sheath of ovipositor greenish. Legs uniform greenish yellow with long white hairs; tarsi and claws somewhat ferruginous.

Type—Female. Length 6.5 mm.; width, 3.6 mm.

Locality: Imperial Co., California. Collector: E. O. Essig. I am indebted for the specimens on which this species is described to Mr. E. O. Essig, of Sacramento, who has very kindly supplied me with some interesting California material.

EXPLANATION OF PLATE III.

Fig. 1. *Telamona alta* sp. nov. (Lateral view)
2. *Telamona alta* sp. nov. (Cephalic view)
3. *Carynota maculata* sp. nov. (Lateral view)
4. *Carynota maculata* sp. nov. (Cephalic view)
5. *Stictocephala minuta* sp. nov. (Lateral view)
6. *Stictocephala minuta* sp. nov. (Cephalic view)
7. *Ceresa occidentalis* sp. nov. (Lateral view)
8. *Ceresa occidentalis* sp. nov. (Cephalic view)
9. *Ceresa occidentalis* sp. nov. (Dorsal view)
10. *Ceresa occidentalis* sp. nov. (Last ventral segment, female.)

Additions to Insects of New Jersey.

By HARRY B. WEISS, New Brunswick, N. J.

Since the publication of the 1909 Report of the New Jersey State Museum containing "The Insects of New Jersey" by Dr. John B. Smith, the following additional species have come to light, the records of which have been taken from ENTOMOLOGICAL NEWS, Bulletins of the Brooklyn Entomological Society, Reports of the New Jersey Agricultural Experiment Station, Transactions of the American Entomological Society, Bulletins of the Maine Agricultural Experiment Station, publications of the U. S. Bureau of Entomology, Proceedings of the U. S. National Museum and personal observations. Thanks are due to Mr. C. A. Frost and Mr. Dury for determinations made in the Coleoptera and to Mr. C. H. Richardson for indicating the sources of most of the records in the Hymenoptera. Credit is given in the text to the collectors who have been kind enough to send me their new records.

Order NEUROPTERA.

Conwentzia angulata Navas. Westfield, Aug. 31. de la Torre Bueno.

Order TRICHOPTERA.

Neuronia smithi Banks. Lakehurst, July 4. Englehart.

Order ODONATA.

Enallagma recurvatum Davis. Lakehurst, June 28, 1913. W. T. Davis.

Libellula exusta deplanata Rambur. Woodbury, May 14, 1912. P. Laurent.

Order HOMOPTERA.

Telamona querci. Summit. Schott.

Cyrtolobus tuberosus. Summit. Schott.

Phylloscelis atra Germ. Harrisia, New Egypt. Three forms: black, long-winged; black, short-winged; brown, short-winged. Injurious to cranberry. H. B. Scammell.

Xestocephalus tessellatus Van D. Newark. E. L. Dickerson.

Chlorotettix galbanata Van D. Newark. E. L. Dickerson.

Trioza magnoliae Ashm. Rutherford, August 18, on bay trees.

Phylloxera foveola Pergande. College Farm, Highland Park and other parts of state. Common on leaves of hickory. C. H. Richardson.

Pseudococcus pseudonipae Ckll. Occurs in greenhouses on *Kentia* sp. H. B. Weiss.

Lecanium corni Bouche. Rutherford, Elizabeth, Riverton. On boxwood in nurseries. Not common. Probably introduced from Holland. H. B. Weiss.

Saissetia oleae Bern. In greenhouses on orange and lemon. H. B. Weiss.

Hemichionaspis aspidistrae Sign. In greenhouses on ferns and *Aspidistra.* H. B. Weiss.

Diaspis bromeliae Kern. In greenhouses on pineapple. H. B. Weiss.

Aspidiotus britannicus Newst. In greenhouses on bay trees. H. B. Weiss.

Aspidiotus tsugae Marlatt. Rutherford, March, 1914, on Japanese hemlock. Introduced from Japan. H. B. Weiss.

Chrysomphalus tenebricosus Comst. Rutherford, Nov., 1912. H. B. Weiss. On red maple.

Ischnaspis longirostris Sign. Montclair, on palms in greenhouse. H. B. Weiss.

Pseudaonidia paeoniae Ckll. Riverton, Princeton. On Japanese azaleas. Not common. Probably introduced from Japan. H. B. Weiss.

Targionia biformis Ckll. In greenhouses on orchids. H. B. Weiss.

Icerya purchasi Mask. In greenhouses on *Acacia* sp. H. B. Weiss.

Ceroplastes cirripediformis Comst. In greenhouses on citrus trees. H. B. Weiss.

Ceroplastes floridensis Comst. In greenhouses on citrus trees. H. B. Weiss.

Order HEMIPTERA.

Banasa sordida Uhl. Madison. Schott.

Lygidea mendax Reut. College Farm, High Bridge, Bridgeton and other parts of state. False apple red-bug.

Corythuca marmorata Uhl. Vineland, July 21. E. W. Stafford.

Ranatra kirkaldyi Bno. Totowa, July. Wintersteiner.

Order ORTHOPTERA.

Periplaneta australasiae Fabr. So. Orange, May 21, 1914. In greenhouse. H. B. Weiss.

Order COLEOPTERA.

Cercyon lateralis. Staten Island, May 25, 1908. Davis. Probably occurs in New Jersey.

Sunius discopunctatus Say. Vineland, March 2. H. B. Weiss.

Baeocera concolor Fab. Vineland, March 2.

Phalacrus consimilis Marsh. Vineland, March 2.

Coccinella transversoguttata Fabr. Malaga, April 29, 1911. H. W. Wenzel.

Scymnillus aterrimus Horn. Whitesbog. H. B. Scammell.

Litargus nebulosus Lec. Vineland, March 2.

Sandalus niger. N. J. Palisades. Nicolay.

Agrilus crinicornis Horn. Newark. H. B. Weiss.

Agrilus masculinus Horn. Newark. H. B. Weiss.

Trichodes nuttalli Kirby. Red Bank, July 4, 1908. Kaeber.

Dinoderus punctatus Say. Vineland, May 4. H. B. Weiss.

Aphodius haemorrhoidalis. Snake Hill, Paterson, under cow manure. Wintersteiner.

Phytonomus melus Fabr. The clover weevil. Ramsey, Hewitt, Lake Hopatcong, Newfoundland, Rahway, from late May to end of July. Springfield. E. A. Bischoff.

Eucactophagus graphipterus Champion. Summit. One specimen only in an orchid house. H. B. Weiss.

Myelophilus piniperda Linn. Rutherford, Sept., 1913. T. J. Headlee. European pine beetle.

Order LEPIDOPTERA.

Papilio rutulus Bdv. Newark, August 11, 1908. L. Doerfel. Probably an accidental visitor.

Basilarchia archippus var. **lanthanis** Cook & Watson. Athenia, August 13, 1911. F. E. Watson.

Dilophonota obscura Fabr. var. **domingonis** Butl. Newark, Sept. 4, 1912. L. Doerfel. Probably a visitor.

Comacla simplex Walk. Passaic Park, July 12, 1906. Taken at light. M. H. Mead.

Hyphantria textor Harris. Passaic Park, June 26. Local, not common. M. H. Mead.

Apantesis intermedia Stretch. Lake Hopatcong, Sept. 15, 1913. F. Lemmer.

Apantesis vittata Fab. form **radians** Walk. Passaic Park, June 4, 1906. Local, rare, taken at light. M. H. Mead.

Acronycta radcliffei Harv. Orange Mts., May 4, 1913. F. Lemmer.

Chytonix sensilis Grote. Cassville, Aug. 17, 1910. W. T. Davis.

Xylophasia nigrior Smith. Passaic Park, July. M. H. Mead.

Leucania minorata Smith. Passaic Park, May and June. M. H. Mead.

Graphiphora garmani Grote. Passaic, April, 1901 and 1914. M. H. Mead.

Xylina disposita Morrison. Passaic Park. M. H. Mead.

Xylina petulca Grote. Rutherford, May 5, 1914. M. H. Mead.

Xylina pexata Grote. Passaic Park, April 17, 1906, Nov., 1911. M. H. Mead.

Nonagria laeta Morr. Elizabeth, 1913. F. Lemmer.

Papaipema necopina Grote. Passaic Park, October. At light. M. H. Mead.

Ochria sauzaelitae. Passaic Park, Sept., 1902. At light. Rare. M. H. Mead.

Xanthia flavago Fab. Passaic Park, October. M. H. Mead.

Anchocelis digitalis Grote. Passaic Park, August, 1913. M. H. Mead.

Epiglaea apiata Grt. New Egypt. Moths taken on cranberry vines. H. B. Scammell.

Derrima henrietta Grt. Passaic Park, July. M. H. Mead.

Plusia simplex Gn. Whitesbog, Pemberton, moths resting on cranberry vines. H. B. Scammell.

Anomis erosa Hbn. Irvington, Nov. 10, 1912. Bred from larvae found on hollyhock. F. Lemmer. (Food plant new record).

Callopistria floridensis Guenee. Passaic, 1907. M. H. Mead. Riverton, Rutherford, in greenhouses, larvae doing much damage to ferns. H. B. Weiss.

Catocala connubialis Gn. So. Elizabeth, July 26, 1912. H. H. Brehme.

Catocala epione Dru. Irvington, July 12, 1913. Larvae on butternut. F. Lemmer. (Food plant new record).

Anticarsia gemmatilis Hbn. Passaic Park, October 11, 1904. M. H. Mead.

Harpyia scolopendrina Bois. Passaic Park, May 3, 1904. Local, rare. Taken at light. **albicoma** Stretch. August 3, 1905, at Passaic Park. M. H. Mead.

Gypsochroa sitellata Gn. Irvington, August 16, 1913. F. Lemmer.

Synchlora liquoraria Gn. Passaic Park, May, June, common. M. H. Mead.

Cleora indicataria Walk. Orange Mts., July 5, 1913. F. Lemmer.

Metrocampa praegrandaria Guenee. Passaic Park, June 24, 1909, August 26, 1910. At light and on tomato vine. M. H. Mead.

Xanthotype crocataria Fabr. var. **caelaria** Hulst. Passaic. M. H. Mead.

Rhyacionia rigidana Fern. Manumuskin. Larvae taken May 21, 1912. Daecke.

Sparganothis violaceana Rob. Pemberton. H. B. Scammell.

Archips georgiana Wlk. Whitesbog. On cranberry and huckleberry. Elizabeth White.

Tortrix bergmanniana Linn. Whitesbog. H. B. Scammell.

Gelechia trialbamaculella Cham. Pemberton. Among cranberry vines. H. B. Scammell.

Dasychira pudibunda Linn. European red-tail. Bergen county by H. Wormsbacher. Probably introduced on nursery stock.

Order HYMENOPTERA.

Kaliosyphinga dohrnii Tischb. Elizabeth. Leaf miner in alder. August, 1913 and 1914. H. B. Weiss.

Neuroterus saltatorius Hy. Edwards. New Jersey. Galls occur on burr oak, white oak, post oak. W. Beutenmuller.

Callirhytis fruiticola Ashmead. New Jersey. Galls in acorns of scarlet, red and black oaks. Beut.

Andricus glandulus Beut. New Jersey. Acorn gall of swamp white oak, chestnut oak and dwarf chestnut oak. Beut.

Andricus operatola Bassett. New Jersey. Galls on acorns of red, scarlet, black and scrub oaks. Beut.

Andricus perditor Bassett. New Jersey. Gall is deformed acorn of scrub oak. Beut.

Aulacidea nabali Brodie. New Jersey. Gall at base of stems of *Nabalus altissima*. Beut.

Perilitus epitricis Viereck. Elmer, Robbinsville, Freehold. From middle of July to beginning of September. Also bred from adult *Epitrix cucumeris*. A. E. Cameron.

Apanteles aristotelae Vier. Anglesea. June.

Apanteles choreuti Vier. Anglesea, July. Reared from *Choreutis carduiella*. Kearfoot.

Apanteles epinotlae Vier. Anglesea, June 15.

Apanteles plesius Vier. Essex County, June 29.

Apanteles trachynotus Vier. Little Silver, June 20.

Phytodietus vulgaris Cress. New Brunswick. Bred from pupa of *T. politana*.

Aspidiotiphagus citrinus Craw. Bred from *Diaspis carueli* Targ. August, 1913. C. H. Richardson.

Coccophagus lunulatus Howard. Bred from a soft scale on *Euonymus* received from Japan. Elizabeth, April 13, 1911. H. B. Weiss.

Encyrtus flavus Howard. Bred from *Coccus hesperidum.* H. B. Weiss.

Pheidole anastasii Emery. Rutherford, April 14, 1914. In greenhouse. H. B. Weiss.

Tetramorium guineense Fabr. Rutherford, April 8, 1914. In greenhouse. H. B. Weiss.

Prenolepis fulva Mayr. subsp. **pubens** Forel. Rutherford, April 14, 1914. In greenhouse. H. B. Weiss.

Monogonogastra rugator Say. New Brunswick, August 6, 1912. Collected in pupal cell of *Lixus concavus* in *Rumex crispus.* H. B. Weiss.

Signophora nigrita Ashm. Bred from San Jose Scale. October, 1913. H. B. Weiss.

Isosoma orchidearum Westwood. The "cattleya fly." Occurs in greenhouses where *Cattleya* spp. are grown. H. B. Weiss.

Order DIPTERA.

Boletina obscura Johannsen. Forest Hill, April. Weidt.

Exechia absoluta Johannsen. Riverton. C. W. J.

Exechia attrita Johannsen. Forest Hill, April, November. Weidt.

Exechia canalicula Johannsen, New Jersey, July.

Exechia captiva Johannsen, Cape May, Sept. Viereck.

Exechia quadrata Johannsen. Cape May, Sept. Viereck. Hemlock Falls, August. Weidt.

Mycetophila fastosa Johannsen. Riverton, Del. Water Gap. C. W. Johnson.

Allodia bulbosa Johannsen. Forest Hill. Weidt.

Allodia falcata Johannsen. Cape May.

Sciara sciophila Lw. Newark. E. L. Dickerson.

Mycothera fenestrata Coq. var. **praenubila** Johannsen. Forest Hill, April. Weidt.

Mycothera impellans Johannsen. Lavallette, May. Viereck.

Dasyneura trifolii Lw. Newark, September 15. Bred from cocoons on surface of clover leaf. The clover leaf midge. E. L. Dickerson.

Prosimulium mutatum Malloch. Glassboro, Mar. 28, 1910. Clementon, May 7, 1910. C. T. Greene.

Prosimulium pecuarum Riley. Iona, April 21, 1907. C. W. Johnson.

Diachlorus ferrugatus Fabr. Weymouth, July 30, 1904. Stone Harbor, August 3, 1907. Daecke.

Dasyllus champlaini Walton. Browns Mills Junc., July 10, 1906.

Psilopodinus flavipes Ald. Merchantville, July 28. Stafford.
Psilopodinus viridicoxa Ald. Trenton, June 8, 1911. Stafford.
Asyndetus harbeckii V. Duzee. Wenonah, June 26. H. S. Harbeck.
Medeterus lobatus V. Duzee. Barnegat City Junc., Aug. 11, 1910. Harbeck.
Medeterus modestus V. Duzee. Avon, Sept. 27, 1908. Harbeck.
Gymnopternus chalcochrus Loew. Wenonah, May 15, 1910. C. T. Greene.
Aphiochaeta fisheri Malloch. Del. Water Gap. C. W. Johnson.
Aphiochaeta lutea Meig. Del. Water Gap, July 12.
Pipunculus aequus Cress. Del. Water Gap, June and July. C. W. Johnson.
Pipunculus minor Cress. Riverton. C. W. Johnson.
Myiolepta strigilata Loew. Iona, May 17, 1914. Harbeck.
Syrphus fisheri Walton. Riverton, July 9, 1910. G. M. Greene.
Merodon equestris Linn. Orange, Oct. 17, 1913. The Narcissus fly.
Zodion intermedium Banks. Malaga, Sept. 15, 1909. C. T. Greene.
Alophora nitida Coq. Pemberton, July 11, 1909. C. T. Greene.
Chaetona nitens Coq. Wenonah, September 5, 1910. C. T. Greene.
Helicobia quadrisetosa Coq. Wenonah, August 21, 1910. C. T. Greene.
Coenosia pallipes Stein. Newark, August 22. E. L. Dickerson.
Scatophaga volucricaput Walk. Newark, 6th to 10th month. E. L. Dickerson.
Oecothea fenestralis Fall. Newark, Sept. 18. E. L. Dickerson.
Sapromyza conjuncta Johnson. Jamesburg, July 4. Avalon, June 8. C. W. Johnson.
Sapromyza disjuncta Johnson. Del. Water Gap, July 12. Wildwood, Aug. 12.
Agromyza maculosa Mull. Newark, Sept. 1. E. L. Dickerson.
Pseudostenophora bispinosa Malloch. Westville, April 11, 1900.

A New Food Plant for Ph. cynthia; Sugaring interfered with by Leucania unipuncta (Lep.).

A new food plant for the larvae of *Philosamia cynthia* was discovered last season by Mrs. A. R. Iliff, 5527 Pulaski Avenue, Germantown. It is the *Eupatorium ageratoides,* to be found in rich woods and fields. Quite a large number of the moths were raised and three generations obtained. Sugaring for Catocalas has been rather discouraging as the army worm moth *Leucania unipuncta* covered the sugared surfaces on the trees to such an extent as to exclude other species. With one stroke of the net hundreds could be swept off the bark.—HERMAN HORNIG, Philadelphia.

A new Species of Neogaurax (Chloropidae, Dipt.).

By J. R. MALLOCH, Urbana, Ill.

Neogaurax fumipennis n. sp.

Female.—Glossy black. Frons brown, becoming yellow towards anterior margin; triangle glossy black; face reddish yellow; antennae reddish, third joint darkened on upper margin; arista brown; cheeks, proboscis and palpi brown. Thorax entirely black, with very slight indications of pruinescence. Abdomen brown-black, slightly shining, the basal two segments yellowish. Legs yellow; apical half of femora and all except the extreme bases and the apices of tibiae of hind legs black; tarsal claws black. Wings with a distinct fuscous area extending from humeral vein nearly to apex of third vein along costa and covering the surface from slightly posterior to third vein to costa; veins brown. Halteres black. All hairs and bristles yellowish white.

Frons nearly half the width of head, and distinctly broader than long; triangle short and broad, reaching well towards anterior margin of frons; surface hairs long, especially on orbits; antennae rather large, third joint rounded, pilosity short; arista as long as anterior width of frons, its pubescence distinct and close; cheek linear, not over one-tenth the eye-height; eye about one and one-half times as high as long, distinctly pubescent. Mesonotum densely covered with rather long pale hairs, which are indiscriminately arranged; surface without distinct punctures or furrows; scutellum rounded, its surface with short hairs, four marginal bristles present. Abdomen short, somewhat pear-shaped, the surface with many short hairs. Legs stout and rather long, their surfaces covered with short hairs. Costal division from humeral vein to end of first vein equal to second division; auxiliary vein complete but indistinct; fourth vein ending at wing tip; third ending slightly nearer to apex of fourth than to second; outer cross-vein short, obliquely placed, its upper extremity nearer to wing tip than its lower; last section of fifth vein one and one-half times as long as penultimate section of fourth.

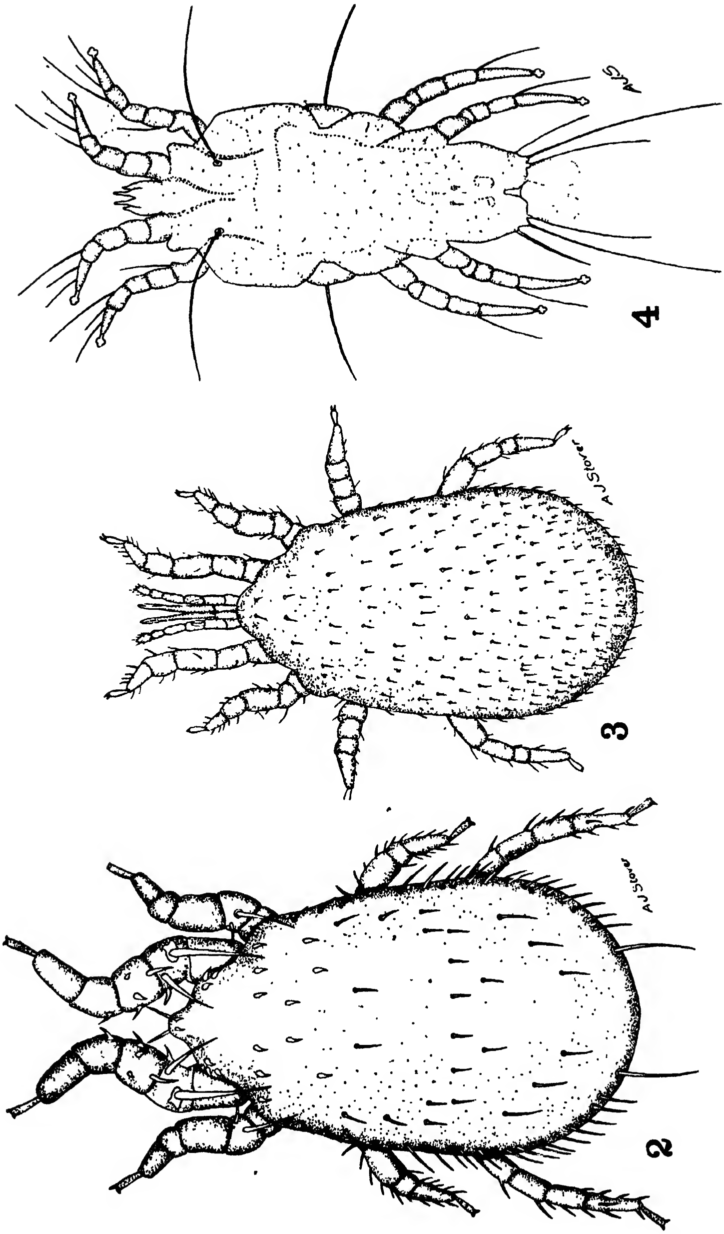
Length, 2 mm.

Type locality, Muncie, Ill. May 24, 1914 (E. H. Swigert). [Illinois State Laboratory of Natural History.]

Separable from *N. montanus* Coquillett by the black scutellum.

Bibliography of Sir John Lubbock.

A "Biological Bibliography" of the late Sir John Lubbock, Lord Avebury, has been published in connection with an obituary notice in the *Proceedings of the Linnean Society of London*, 126th Session, pp. 56-59. October, 1914.



NEW PARASITIC MITES—EWING AND STOVER.

New Parasitic Mites (Acarina).

By H. E. Ewing and A. J. Stover.*

(Plate IV)

Parasitism is a phenomenon of quite frequent occurrence in the Acarina. Of the thirty or more families now recognized in the order, no less than seventeen contain species that are parasitic in their adult state; while three more contain species that have parasitic larvae. The number of parasitic species found in the order is very large, several hundred already being described. Yet, notwithstanding this large number of parasitic species, to say nothing of the enormous numbers of individuals that are frequently found upon a single host, up to the present practically no systematic work has been done upon them in this country, with the exception, of course, of the ticks.

In the following paper four new species are described. They are distributed among three genera, and as many families. So far, we have but a single species in each of these three genera recorded from our country. Hence these new additions are of rather special interest to those engaged in the study of mites. The determinations of the species described in this paper were made by Mr. Ewing. The drawings were made by Mr. Stover. Types in the collection of the senior author.

Description of Species.

Fam Gamasidae.

Haemogamasus sanguineus n. sp. (Text-fig 1)

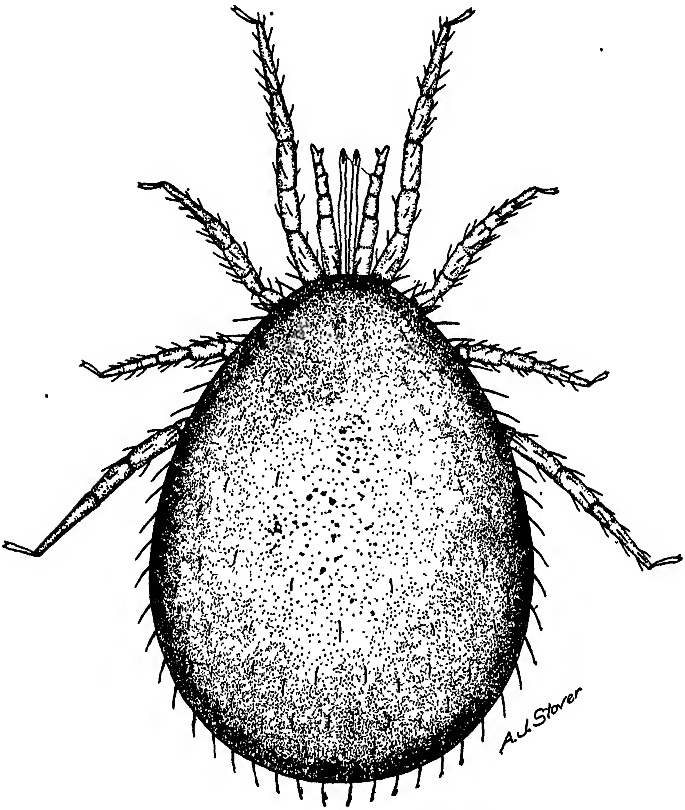
Engorged specimen tick-like in shape, body appearing red with many black pellets contained inside showing through the skin.

Female.—Mouth-parts moderate; palpi about one-half as long as the first pair of legs; chelicerae when extended reaching the tips of the palpi. Distal segment of palpus almost twice as long as the segment next to it, well clothed with hairs, and bearing a sharp, spur-like spine on its inner margin; penultimate segment slightly longer than broad, simple; antepenultimate segment about one and one-half times longer than penultimate, slightly produced anteriorly at its inner mar-

*A contribution from the Department of Zoology and Physiology, Oregon Agricultural College, Corvallis, Ore.

gin. Chelicerae slender, both arms very tapering and adapted for piercing.

Cephalothorax not demarcated from abdomen. Body sparsely clothed with curved, sharp bristles. Most of these bristles have each, one or more small branches on the outer curved margin. On the anterior end of the body is situated a small pair of submedian straight bristles.



Text fig. 1.—*Haemogamasus sanguineus* n. sp.

Legs rather slender; first pair reaching beyond the tips of the palpi by the full length of the last two segments; fourth pair falling far short of the tip of the abdomen. Tarsus of leg I slightly longer than tibia, clothed with somewhat lengthened hairs; tibia subequal to genual. Leg II slightly, if at all, enlarged, somewhat longer and stouter than leg III. Tarsus of leg IV very long and tapering, about one and one-half times as long as tibia; tibia not as stout as

genual. Tarsal claws of all the legs rather small, and strongly curved. Total length of female, 0.96 mm.; width, 0.70 mm.

Male.—Not found.

From Ames, Iowa; taken from *Mus rattus* Linn. by H. E. Ewing.

An adult female and an immature individual obtained. This species differs from *H. americanus* Banks in having shorter and much stouter legs, in having larger mouth-parts, etc. The fourth pair of legs in *H. americanus* Banks extend beyond the tip of the abdomen; in *H. sanguineus* n. sp. they fall far short of the tip of the abdomen.

Fam. DERMANYSSIDAE.

Liponyssus spiniger n. sp. (Plate IV, Fig. 2.)

A rather large, dark brown species. Integument well chitinized. Body and appendages well clothed with prominent stout spines.

Female.—Mouth-parts only moderately prominent; palpi about one-half as long as first pair of legs, with simple segments and no large spines. Chelicerae slender.

Cephalothorax not demarcated from abdomen, strongly emarginate on its sides, and ending anteriorly in a medium papilla-like process. Dorsally the cephalothorax bears several pairs of very short, stout, slightly curved, sharp spines; one of these pairs is situated on the anterior papilla-like process, two pairs are situated laterally, and one pair is situated on the antero-lateral margin of the shoulders. Besides these short, stout spines, a longer straight pair is situated on the anterior aspect of the papilla-like process.

Abdomen about three-fourths as broad as long, broadest above the last pair of legs, and evenly rounded behind. Abdomen clothed with prominent spines; those on its dorsal surface rather short but sharp, those on the sides of abdomen large, stout, and slightly curved. On the posterior margin of abdomen is situated a single pair of spines, the longest pair found on the body. Anal plate about three-fourths as broad as long, broadest at its base and rounded at its tip; with but a single spine which is located on its posterior margin at the median line.

Legs stout, the first and second pairs subequal and stouter than the third and fourth pairs. Last pair of legs extending to the level of the posterior margin of the abdomen. All the legs well clothed with spines; the first legs each bear two enormous spines on the dorsal surface of the femur; the outer is slightly the larger and considerably longer than the segment from which it springs; above the inner at the

base of the patella is a prominent but much shorter spine. Each femur of the second pair of legs bears a long slender spine on its dorsal aspect; this spine is somewhat smaller than either of the enormous spines borne by the femora of the first pair of legs. All the legs bear rather prominent caruncles at the tips of their tarsi; tarsal claws rather weak. Total length of female, 0.77 mm.; width, 0.50 mm.

Male.—In general similar to the female, but smaller. Body broadest above the third pair of legs, instead of above the last pair, as is the case with the female. Sternal plate about twice as long as broad; genital opening situated about its width from the anterior margin of the genital plate. The sternal plate bears four pairs of long, straight, sharp, backwardly directed spines, situated as follows: One pair at the genital opening about one-half of the distance from the opening to the lateral margins of sternal plate, one pair on the lateral margins of the sternal plate opposite the second pair of legs, one pair situated on the lateral margins opposite the third pair of legs, and one pair situated sublaterally half-way between the third and fourth pairs of legs. Anal plate somewhat different from anal plate of female, its sides concave; it extends backward to the posterior margin of the abdomen.

Coxa of leg I, with a row of three stout spines along its lateral margin as is found in the female, but they are longer in the male; proximal spine considerably longer than the other two. Fourth legs extending beyond the tip of abdomen by about one-third their length. Total length of body, 0.63 mm.; width, 0.36 mm.

From Ithaca, New York State; taken from muskrat by the writer.

Described from four females and one male. This species is quite distinct from the others of the genus on account of its large spines.

Liponyssus crosbyi n. sp. (Plate IV, Fig. 3.)

A moderate-sized, pale yellowish brown species, without prominent hairs or spines.

Female.—Mouth-parts prominent. Palpi two-thirds as long as the first pair of legs; mandibles long, slender, when extended reaching the tips of the palpi.

Cephalothorax not demarcated from abdomen, almost nude. Sternal plate slightly broader than long, broadest at its posterior end, and with three pairs of submarginal bristles; all long, straight, and directed backward.

Abdomen about two-thirds as broad as long, evenly rounded behind, and sparsely clothed with fine hairs. Anal plate triangular, slightly

longer than wide, with a small spine near its tip, and a similar spine on each side of the anus. Anus situated about its width from the front margin of the anal plate.

Legs moderate; first pair extending beyond the tips of the palpi by about one-third their length; fourth pair not quite reaching the posterior margin of the abdomen. The first and fourth pairs of legs are subequal in length. The second pair is slightly enlarged. Tarsus of leg I, clothed at its tip with many fine bristles. Pulvilli of all the legs rather large, tarsal claws moderate, strongly curved. Total length of female, 0.58 mm.; width, 0.34 mm.

Male.—Not observed.

From Rockport, Missouri; taken from bat, *Vesper subulatus* Say by C. R. Crosby.

Three adult females and one immature specimen obtained. Description made from a single individual, the type specimen. The other adult females labeled as cotypes. This species differs from *Liponyssus americanus* Banks in the shape of its body which is more pear-like, in having much shorter and stouter legs, as well as in several other characters.

Fam. ANALGESIDAE.

Proctophyllodes trisetosus n. sp. (Plate IV, Fig. 4.)

A medium-sized, light brown species; with posterior bristles quite prominent.

Male.—Mouth-parts extending forward for about one-half the length of the first pair of legs.

Dorsal shield of cephalothorax granular, moderately chitinized, slightly broader than long, and bearing near each side a large tactile bristle which is longer than the shield itself. Epimera of first pair of legs well chitinized, and contiguous at their posterior ends though not fused together. Epimera of second pair of legs well chitinized, crescent-shape, and diverging strongly for the posterior two-fifths of their length.

Dorsal plate of abdomen broadest at its anterior end; about two and one-half times as long as broad, and slightly granular. From the sides of the abdomen just in front of the third pair of legs there extends a long pair of bristles. These bristles are about one-half as long as the abdomen. Genital area inverted U-shaped. Penis sharp, stout, spine-like; extending from the anterior margin of the genital area backward about two-thirds the distance to the bases of anal suckers. Anal suckers strongly chitinized, about one and one-half times as long as they are broad at their bases. Hyaline plates foliaceous, not more than

two-thirds as long as that part of the abdomen behind the fourth pair of legs. Just laterad to the hyaline plates is situated a pair of bristles which extend backwards for about twice the length of the plates. On the posterior corners of the abdomen is situated a pair of very large bristles. These are over one-half as long as the body of the mite. Just in front of this pair of large bristles is a smaller pair about one-third as long.

Legs moderate; fourth pair reaching beyond the tip of abdomen by the entire length of the tarsus. Length of body, 0.28 mm.; width, 0.13 mm.

Female.—Body larger and more strongly chitinized than in male. Cephalothorax as broad as long; sides almost parallel. Dorsal shield of cephalothorax granular, two-thirds as broad as the cephalothorax itself. Dorsal bristles situated near the incisions in the dorsal shield for the second pair of legs. They are somewhat longer than the cephalothorax.

Abdomen about twice as long as cephalothorax. Dorsal shield of abdomen rectangular, slightly over twice as long as broad. Posterior tubercles of abdomen rather prominent, as long as the posterior segment from which they extend. The bristles borne by the posterior tubercles are quite stout, each being about one-half as long as the abdomen. Epiandrium crescent-shaped, strongly chitinized and almost one-half as broad as the width of the body at the region where it is situated.

Legs similar to those of the male; fourth pair just reaching the tip of abdomen, excluding the posterior tubercles. Length of body, excluding posterior tubercles, 0.40 mm.; width, 0.16 mm.

From Ithaca, New York; taken from meadow lark, *Sturnella magna* Linn. by H. E. Ewing.

Descriptions made from type specimens. Many males, females, and young collected. The crescent-shaped, or inverted U-shaped, epiandrium, and the shortness of the anal suckers characterize this species from most of the others.

Lucilia morrilli T.—A Correction (Dipt.).

On page 112, volume XXV, of the NEWS, what is said under *Lucilia morrilli* must be retracted. It was written when examination of the type and cotypes was impossible. I have since examined these and find that I was mistaken, and that the actual type and cotype material is undoubtedly *Ps. cornicina* F.—CHARLES H. T. TOWNSEND.

The Lepidoptera of the Douglas Lake Region, Northern Michigan.*

By Paul S. Welch, Manhattan, Kansas.

During the summers of 1911-1913 the writer had an opportunity to study the Lepidoptera of northern Michigan in the immediate vicinity of Douglas Lake. Collections made throughout the months of July and August of the three years are used as the basis of this report. An attempt has been made to have the list as complete as possible, but future collecting will, no doubt, make important additions. However, it includes many species which have not been reported from northern Michigan and is doubtless complete enough to give a fairly accurate idea of the Lepidopterous fauna of this region. Tortricidæ and Tineidæ were collected at every opportunity, but no attempt has been made as yet to study these groups, although a few of the more easily identified species have been included in the list.

Douglas Lake, formerly known as Turtle Lake, is situated in the extreme northern part of the southern peninsula of Michigan, about eighteen miles south of the Straits of Mackinac. Forests of hardwoods and conifers formerly covered the greater part of this region, but only remnants of the primeval forest remain—the results of the ravages of forest fires and lumbermen. Extensive burned-over tracts occur near the lake and produce a wild profusion of aspen, bracken fern, blueberry, and other plants common to such a situation. Two primitive tracts of hardwoods lie near the shores of the lake. Two extensive cedar bogs and several smaller ones are present in the immediate vicinity. Along the north shore is a series of beach pools, rich in animal and plant life. Five other lakes of varying size lie within a radius of eight miles. Excepting the areas covered by bogs, the soil is almost pure sand. The variety of conditions is accompanied by a corresponding variety in the vegetation, there being about five hundred species of flowering plants and a large number of non-flowering plants in the region. Such a flora can furnish food for the larvæ of

*Contribution from the University of Michigan Biological Station, No. 24.

numerous species of Lepidoptera and leads us to expect a well-represented fauna of this order.

Cwing to the fact that so few local lists of Michigan Lepidoptera have been published, it is not practical to attempt to compare the fauna of Douglas Lake with that of other parts of the state. The present list contains a large number of species of northern range. When compared with the studies on Canadian Lepidoptera by Dod, Gibson, Winn, and others, a distinct resemblance to the faunas of Quebec, Ontario, and Manitoba is evident. A detailed comparison with the south Canadian fauna is interesting, but beyond the limitations of this paper.

The value of local surveys in extending our knowledge of the distribution of any group of insects depends greatly upon the accuracy of the identification of the species involved. In order to make the following list as accurate as possible, all determinations involving the slightest uncertainty due to defective specimens, insufficient material, and the like, have been indicated. The writer wishes to express his indebtedness to Dr. William Barnes, of Decatur, Illinois, for the privilege of working in his splendid collection. Acknowledgments are also due to Dr. Barnes and his colleague, Dr. J. H. McDunnough, for assistance in determining the more difficult material.

RHOPALOCERA.

NYMPHALIDAE.

Danais plexippus Linn.
Argynnis cybele Fabr.
Argynnis atlantis Edw.
Argynnis bellona Fabr.
Phyciodes tharos Dru.
Grapta interrogationis Fabr.
Grapta comma Harris.
Grapta j-album Bd. & Lec.
Vanessa antiopa Linn.
Vanessa milberti Godt.
Pyrameis atalanta Linn.
Pyrameis huntera Fabr.
Pyrameis cardui Linn.
Limenitis ursula Fabr.
Limenitis arthemis var. proserpina Edw.
Limenitis archippus Cram.
Satyrus alope var. nephele Kirby.

LYCAENIDAE.

Lycæna comyntas Godt.
Feniseca tarquinius Fabr.
Chrysophanus hypophlæas Bdv.

PAPILIONIDAE.

Pieris rapæ Linn.
Colias eurytheme var. eriphyle Edw.
Colias philodice Godt.
Papilio glaucus var. turnus Linn.

HESPERIDAE.

Pamphila hobomok Harris.
Pamphila peckius Kirby.

HETEROCERA.

Sphingidae.

Hyloicus chersis Hbn.
Sphinx (Smerinthus) jamaicensis var. geminatus Say.
Haemorrhagia (Hemaris) diffinis var. aethra Strk.

Saturniidae.

Samia cecropia Linn.
Telea polyphemus Cram.

Syntomidae.

Lycomorpha pholus Dru.
Ctenucha virginica Charp.

Lithosiidae.

Hypoprepia miniata Kirby.
Hypoprepia fuscosa Hbn.
Clemensia albata Pack.

Nycteolidae.

Sarrothripa revayana Scop.

Arctiidae.

Eubaphe immaculata var. trimaculosa Reak.
Eubaphe aurantiaca var. brevicornis Wlk.
Haploa confusa Lyman.
Hyphoraia parthenos Harris.
Apantesis parthenice Kirby.
Apantesis phyllira Dru. (?)

Noctuidae.

Acronycta americana Harris.
Chytonix sensilis Grt.
Hadena devastatrix Brace.
Hadena arctica Bdv.
Pyrophila pyramidoides Gn.
Rhynchagrotis anchocelioides Gn.
Rhynchagrotis placida Grt. (?)
Rhynchagrotis alternata Grt. (?)
Agrotis ypsilon Rott.
Agrotis geniculata G. & R.
Noctua smithii Snell.
Noctua haruspica Grt.
Noctua inopinata Sm.
Noctua clandestina Harris.
Feltia subgothica Haw.
Porosagrotis vetusta Wlk.
Porosagrotis mimallonis Grt.
Mamestra imbrifera Gn.
Mamestra purpurissata Grt.
Mamestra cervina Sm.
Mamestra renigera Steph.
Mamestra vicina Grt.
Heliophila multilinea Wlk.
Bellura melanopyga Grt.
Scoliopteryx libatrix Linn.
Plusia aeroides Grt.
Marasmalus inficita Wlk.
Metathorasa monetifera Gn.
Homopyralis contracta Wlk.
Drasteria erechtea Cram.
Catocala ultronia Hbn.
Catocala briseis Edw.
Catocala concumbens Wlk.
Parallelia bistriaris Hbn.
Epizeuxis lubricalis Geyer.
Epizeuxis aemula Hbn.
Epizeuxis sp.
Zanclognatha ochreipennis Grt.
Bleptina caradrinalis Gn.
Renia flavipunctalis Geyer.
Palthis angulalis Hbn.
Capis curvata Grt.
Plathypena scabra Fabr.

Thyatiridae.

Habrosyne scripta Gosse.

Notodontidae.

Melalopha albosigma Fitch.
Datana ministra Dru.
Hyperaeschra stragula Grt.
Lophodonta angulosa S. & A.
Schizura concinna S. & A.

Schizura unicornis S. & A.
Cerura scitiscripta var. multiscripta Riley.
Harpyia sp.
Gluphisia septentrionalis Wlk.

LASIOCAMPIDAE.

Malacosoma americana Harris.
Malacosoma disstria Hbn.

GEOMETRIDAE.

Eudule mendica Wlk.
Euchoeca albovittata Gn.
Euchoeca albifera var. brunneifasciata Pack. (?)
Eustroma nubilata Pack.
Rheumaptera sociata Bork.
Percnoptilota fluviata Hbn.
Hydriomena autumnalis Ström.
Gypsochroa designata Hbn.
Cosymbia lumenaria Hbn.
Synelys ennucleata var. revelata Swett.
Physostegania pustularia Gn.
Gueneria basiaria Wlk.
Deilinia variolaria Gn.
Sciagraphia mellistrigata Grt.
Cymatophora pustularia Hbn.
Caripeta divisata Wlk.
Cleora indicataria Wlk.
Lycia cognataria Gn.
Xanthotype crocotaria Fabr.
Ania limbaria Haw.
Euchlaena effectaria Wlk.
Euchlaena johnsonaria Fitch.
Sabulodes transversata Dru.

SESIIDAE.

Aegeria tibialis Harr.
Aegeria apiformis Linn.
Sanninoidea exitiosa Say.
Sesia rutilans Hy. Edw. (?)

PYRALIDAE.

Lipocosma fuliginosalis Fern.
Desmia funeralis Hbn.
Evergestis straminalis Hbn.
Nomophila noctuella Schiff.
Loxostege commixtalis Wlk.
Phlyctaenia helvalis Wlk.
Pyrausta pertextalis Led.
Pyrausta fumoferalis Hulst.
Pyrausta funebris Ström.
Nymphula icciusalis Wlk.
Nymphula ekthlipsis Grt.
Nymphula allionealis Wlk.
Nymphula badiusalis Wlk.
Nymphula maculalis Clem.
Pyralis farinalis Linn.
Herculia himonalis Zell.
Schoenobius tripunctellus Rob. (?)
Schoenobius mellinellus Clem. (?)
Crambus pascuellus Linn.
Crambus hortuellus Hbn.
Crambus caliginosellus Clem.
Thaumatopsus sp.
Chilo comptulatalis Hulst.
Acrobasis comptoniella Hulst.
Meroptera pravella Grt. (?)
Salebria sp.
Peoria approximella Wlk.

PTEROPHORIDAE.

Oxyptilus periscelidactylus Fitch. (?)

TORTRICIDAE.

Exartema permundanum Clem. (?)
Archips purpurana Clem.

YPONOMEUTIDAE.

Harpipteryx frustella Wlsm.

ELACHISTIDAE.

Lymnæcia phragmitiella Staint.

TINEIDAE.

Scardia anatomella Grt.

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The following titles include all of the lists of Michigan Lepidoptera known to the writer. Many scattered references to individual species taken in the state occur in the literature but are omitted here.

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Sympetrum corruptum, a Dragonfly, at a High Altitude (Odon.).

I am taking the liberty of sending you a dragonfly which I thought might be of interest on account of the altitude at which it was taken. I was giving a course in biology at the summer school of the State University and one of my pupils, Miss Rosamond Little, of Limon, Colorado, took this specimen when we were ascending Arapahoe Peak, July 18, 1914. It was a surprise to us to find a dragonfly at this altitude (13,000 ft.). It was doubtless carried up by the strong wind currents from one of the subalpine lakes below. Though a common species, I thought that the altitude record might be worth while.—Ellsworth Bethel, East Side High School, Denver, Colo.

[The specimen sent by Mr. Bethel was a female. There is a record by Dr. Henry Skinner of this species at 11,000 feet, at Silver Lake, Colorado.—Ed.]

Classification of Orders of Insects.

By C. W. Woodworth, University of California, Berkeley, Calif.

One of the most confusing things confronting a beginner in Entomology, and which often remains an enigma to more experienced students, is the great variety in the number and arrangement of the Orders to be found in the various text books.

The accompanying chart, which has been used in my classes with very good results as an aid in the comprehension of this subject, presents seven systems of classification: that of Linnaeus, those given in five standard American text books and the system adopted by myself in which the groups follow in chronological sequence. The names most frequently used for all but two of the 41 groups which have at some time been raised to the rank of Orders are also given, together with a list of Genera, mostly Linnaean, which may be considered the types of these groups.

In each column the numerals give the sequence followed by the different authors. The groups not indicated by figures in any column were combined in the preceding numbered order by that author and numbers in parenthesis indicate such cases where this arrangement cannot be followed. Thus Linnaeaus included the Siphonaptera, Thysanoptera and Corrodentia in his order 7. Aptera. Where other names than those in the first column were used this is indicated in the foot notes. Thus Physopoda was used by Comstock for his order 10, which other authors called Thysanoptera. When a group was discovered near or after the date of an author as indicated in the last column, it was of course not considered by that author. Thus my classification alone locates the Zoraptera and Protura.

An inspection of the table will bring out the following points regarding the classifications of these authors:

1st. Comstock alone separates the Euplexoptera from the Orthoptera.

2nd. Folsom alone raises the Collembola to ordinal rank.

3rd. Only Comstock and Kellogg sub-divide the Corrodentia.

4th. Three authors separate the Thysanoptera and Siphonaptera from the Hemiptera and Diptera respectively, and all recognize their near relationship with these orders as shown by their consecutive arrangement.

5th. The same three authors separate and bring the Neuropterous groups with complex metamorphosis into juxtaposition with the higher groups which were derived from them.

TABLE SHOWING THE CLASSIFICATION OF INSECTS INTO ORDERS.

Names of Orders Orders adopted herein. Additional orders used by authors here cited. Groups not largely accepted.	1758 Linnaeus	1894 Comstock	1897 Smith	1905 Kellogg	1906 Folsom	1913 Sanderson	Types of Orders Linnæan Genera. Genera based on Linnæan species. Genera discovered since 1758.
11. Lepidoptera	3	15	7	17	13	12	Papilio.
10. Hymenoptera	5	19	8	18	17	14	Apis.
9. Diptera	6	16	9	15	15	13	Musca.
Homaloptera	....	....	....	....	....	....	Hippobosca.
Siphonaptera	(7)	17	....	16	16	...	Pulex.
8. Coleoptera	1	18	6	14	14	11	Carabus
Acreioptera	....	....	....	....	....	....	1869 Platypsylla W.
Strepsiptera	....	..	....	....	....	....	1802 Stylops Kirby.
7. Hemiptera	2	11	5	9	9	10	Notonecta.
Homoptera	....	....	....	....	....	....	Cicada.
	....	....	...	....	....	....	Aphis.
Proboscidia	....	....	....	....	....	....	Coccus.
Anoplura	....	....	..	....	....	...	Pediculus.
Thysanoptera	(7)	10*	. .	10	8	....	Thrips.
6. Orthoptera	(1)	9	4	8	3	2	Gryllus.
Zoraptera	....	....	....	....	....	....	1913 Zorotypus Sil.
Mantoidea	....	....	....	....	....	....	Mantis.
Phasmoidea	....	....	....	....	....	..	1795 Phasma Licht.
Blattoidea	....	....	....	....	...	....	Blatta.
Diploglossata	....	....	....	....	....	....	1871 Hemimerus W.
Euplexoptera	....	8	...	....	....	...	Forficula.
5. Corrodentia	(7)	6	(2)	6	4*	9	1767 Psocus Latr.
Isoptera	....	5	....	5	....	...	Termes.
Embioptera	....	....	....	....	...	...	1825 Embia Latr.
Mallophaga	....	7	..	7	....	...	1818 Menopon Nitz.
4. Ephemerida	(4)	2	(2)	2	6	6	Ephemera.
3. Odonata	(4)	3	(2)	4	7	8	Libellula.
2. Neuroptera	4	12	3	11	10	3	Hemerobius.
	....	...	....	...	....	....	1834 Coniopteryx C.
Raphidoidea	....	....	....	....	....	...	Raphidia.
Megaloptera	....	...	....	....	....	.	1803 Sialis Latr.
Mecoptera	....	13	....	12	11	4	Panorpa.
Trichoptera	....	14	...	13	12	5	Phryganum.
Plecoptera	....	4	2*	3	5	7	1764 Perla Geof.
1. Aptera	7	(1)	1	(1)	2†	1	Podura.
Symphleona	....	...	...	....	....	....	1806 Smynthurus Latr.
Thysanura	....	1	....	1	1	....	Lepisma.
Machiloidea	...	...	..	....	....	....	1806 Machilis Latr.
Dicellura	....	....	....	....	....	....	1864 Japyx Halid.
Rhabdura	....	....	....	....	....	....	1824 Campodea W.
Protura	....	....	....	....	....	....	1909 Acerentomon S.

10* Physopoda. 4* Platyptera. 2* Pseudoneuroptera. 2† Collembola.

6th. Sanderson separates these groups without rearrangement.

7th. Smith follows the old plan of keeping them as one order adjacent to the Pseudoneuroptera with simple metamorphosis.

8th. Folsom and Sanderson place the Orthoptera lowest of winged insects in accordance with the theory of the origin of wings in a terrestrial rather than in an aquatic insect.

9th. Comstock and Kellogg begin the winged insects with Ephemerida on the basis that the multiplicity of wing veins indicates primitive structure, and

10th. All the recent authors cited differ among themselves in the arrangement of the four higher orders. This can perhaps be best shown in another way. Below these orders are indicated by their initials:

Comstock	L D C H	Folsom	L C D H
Smith	C L H D	Sanderson	C L D H
Kellogg	C D L H	Woodworth	C D H L

If the list were extended one would find practically all possible permutations. These authors show some agreement, thus:

1st. Four place Coleoptera lowest, two the Lepidoptera.

2nd. Four place Hymenoptera highest, one each Diptera and Lepidoptera.

3rd. The Diptera are placed by four authorities adjacent to the Hymenoptera and to the Coleoptera.

4th. The Lepidoptera are placed by three authorities adjacent to each of the other orders.

5th. In no case are the Hymenoptera and Coleoptera adjacent.

There does not seem to be any good reason for this remarkable diversity of views nor any prospect that uniformity can come except from the adoption of some principle like that of geological sequence, that will make it no longer a matter of mere personal judgment, but one to be decided by the determination of fact.

Mosquito Extermination Work in Philadelphia, Pa.

By HERMAN HORNIG.

Inasmuch as the extermination of house flies and mosquitoes is as necessary to the public health and comfort of a large city as pure water and sewers, Philadelphia has tried with a small amount of money to reduce the breeding places of the house and saltmarsh mosquitoes.

During the summer of 1912, work was started in the southern section of the city along the Delaware River on a tract consisting of about 8000 acres of lowlands, which contained railroad embankments, boathouses, truck farms, piggeries, meadows and swamps. The early settlers of the city, who used this land exclusively for pasture and farming, had established canals and ditches for transportation and drainage. Later generations neglected the farms and helped to build up an industrial centre further north. As a result the waterways gradually became overgrown with vegetation and filled in with soil. Swamps were therefore created and mosquitoes found ideal breeding places between the tall reed grasses.

The ditches near the piggeries were polluted and full of larvae from May until September and the cleaning of these improved conditions remarkably.

Near the junction of the Schuylkill and Delaware Rivers a large amusement park had been erected and owing to the mosquito nuisance a large force of men was employed to abolish breeding places within the premises. Constant oiling of the numerous ditches and filling in of waterholes gave gratifying results, permitting park amusements to continue until the end of the season.

The following year 1913, extermination work was extended over the entire city. During the first few months, lectures on the life history of mosquitoes were given in different localities and in all of the schools, so that the future citizens would know where mosquitoes come from and how to exterminate them.

In addition all citizens were asked to co-operate as much as possible and mosquito literature was distributed to every

customer entering certain grocery stores. During the season about 20 miles of ditches were cleaned and dug and over 30,-000 sewer catchbasins oiled.

Pools in lots, surface drains, dumps and receptacles holding water, were also looked after as much as possible. The sewers were found to furnish a constant supply of mosquitoes from the middle of July until November and later, whereas open air breeding was not observed after the end of October. It was found that the temperature of some sewers, six feet below the surface, was from 12 to 20 degrees higher than that of the surface.

In 1914 Councils appropriated $1400 for extermination work and, as the city contains 129½ square miles, it is apparent even to the layman that such a sum of money for a city with a population of one and three-quarter million people is insufficient. The attempt, however, shows progress, as such a step was never thought of by any previous administration. The extermination work is conducted by the Bureau of Highways under the guidance of an engineer.

There is no actual house to house inspection or any thorough work done to maintain ditches in good order. The force of men during the past season varied from two to eight and the most efficient work accomplished was the oiling of sewer inlets. Over 40,000 treatments were given from September until the middle of November. This kind of work, which was carried on until the middle of December in 1913, proved satisfactory, as the number of hibernating mosquitoes was kept so low that no complaints were received until four weeks after the heavy rains in May, 1914. With a sufficient force of men destroying the newly-created breeding places, the mosquitoes would have been reduced to a minimum. Tanks and fire buckets in hotels, apartment houses and factories supplied the business sections with mosquitoes and empty houses, with hoppers full of undisturbed water, were responsible for infestations in the residential sections.

A new method was tried by the Board of Health to dispose of stagnant pools difficult to drain and too remote to fill in. Dynamite was placed in the pools and a hole about 20 feet

deep blown in the middle. It was expected that the water would disappear by seepage, the hole being afterwards filled with large stones. From observations made at the two localities where it was tried it can be stated that the results were unsatisfactory.

Several creeks receiving sewage from adjoining sections furnished most of the open air breeding places. Along the edges where the water had come almost to a standstill, on account of broken banks and storm-broken trees, great colonies of *Culex pipiens* were observed. Some of these colonies were from one to two feet long and a foot wide, the larvae being so close to each other as to discolor the water and form a solid mass. In some sections a few men were employed to clear out the tree stumps and establish a better flow of water.

At one time large swarms of mosquitoes were observed at one of the sewer outlets. Upon investigation it was found that a wheelbarrow, which had been left by one of the workmen about 30 feet inside the sewer, was impairing the flow of sewage and forming a breeding pool.

In the southern part of the city a chemical factory discharges its waste water into the meadows and this favors the breeding of saltmarsh species. Several small pools in this section formed by heavy rains only and a pool in a dye-polluted creek contained millions of larvae of *Aedes sollicitans* and *A. taeniorhynchus*. *Psorophora ciliata* was found abundantly in swampy parts in company with *Aedes sylvestris* and *Culex pipiens*. Only a few specimens of *Aedes jamaicensis* and *Aedes triseriatus* were collected and *Aedes canadensis, Culex restuans, Culex salinarius* and *Coquellittidia perturbans* were found scattered in the suburbs. *Anopheles punctipennis* larvae were found in all of the smaller runs, in cattle footprints, in meadows and near stables, often breeding in the same receptacle with *Culex pipiens*.

A Preoccupied Specific Name in Tipula (Dipt.).

Having inadvertently applied the name *suspecta* to a newly described species of *Tipula* in my recent paper, entitled "On the Hebes Group of the Dipterous Genus Tipula Linnaeus," the name being preoccupied by *Tipula suspecta* Loew, I wish to apply the name *Tipula afflicta* for the species in question.—W. G. Dietz, Hazleton, Pa.

Notes on Two Beetles Reared from Dead Wistaria Sticks (Col.).

By DAYTON STONER, State University of Iowa, Iowa City, Ia.

While trimming off the dead branches of a Wistaria vine (*Wistaria chinensis* DC.) at my home on May 28, 1914, I observed that some of these dead twigs showed evidences of the work of wood-borers. A few of the twigs were cut off and placed in a loose-topped glass jar in the Entomological Laboratory of the State University of Iowa and on the following day, May 29, two adult *Chrysobothris azurea* Lec., male and female, emerged. This species has not before been recorded from Iowa.

On May 29, while again trimming the same vine, I found a specimen of *Lepturges querci* Fitch crawling on one of the branches. This time a number of short pieces of the dead vine, amounting in all to about 18 feet, were removed to a glass jar in the laboratory and devolopments awaited. The diameter of the sticks varied from ¼ inch to about 1 inch, those nearer the base of the vine and hence of the larger diameter being most heavily infested. The smaller branches of the vine above 5 feet from the ground were apparently not infested although many were dead, due, very probably, to the work of the larvae in the larger stems lower down. The glass jar containing the sticks was kept on a shelf where sunlight could not strike it and where it was not directly exposed to daylight. A temperature of between 70° and 80° Fahr. was maintained in the room.

The two species of beetles emerging from the wood, together with the dates of emergence and number of each species, are indicated in the following table:

	Chrysobothris azurea Lec.	*Lepturges querci* Fitch.
29 May	2 (1 male & 1 female)	..
30 "	2 (both males)	6
1 June	3 (2 males & 1 female)	19
2 "	1 (female)	4
3 "	1 (female)	3
4 "	..	5
5 "	..	4
10 "	..	1
	Total— 9	Total—42

These Iowa specimens of *Chrysobothris* average a little larger and the elytral foveae are more distinctly bronzed or metallic than those from New York and Massachusetts in Professor H. F. Wickham's collection.

There are, perhaps, two things of particular interest in regard to this experiment: first, the great number of *Lepturges querci* secured from a comparatively small number of twigs indicates a very high degree of infestation; second, in the rather limited number of *Chrysobothris azurea* obtained the males averaged a little earlier in emergence than the females. This is, however, not an unusual occurrence among other species of Coleoptera. I believe also that *Wistaria chinensis* has not been recorded as a host plant for either of these species of beetles.

I am indebted to Professor H. F. Wickham for the determination of the *Chrysobothris* and to Professor R. B. Wylie for the determination of the *Wistaria*.

Fragments on North American Insects—VIII.

By A. A. GIRAULT, U. S. National Museum, Washington, D. C.

Difference in Habit as a Basis for Specific Differentiation.

I have noticed a tendency lately with entomologists and others to make a difference in habit coequal with a difference in structure and coloration as regards species. My attention was drawn again to this matter by casually noticing that Pierce, Cushman, Hood and Hunter (Bull. No. 100, Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C., p. 53, footnote. 1912) separate a braconid into two species—*Microbracon dorsata* and *mellitor* of Say—on the basis of a difference in social habit. They admit the two are alike structurally; in habit they differ in that *mellitor* is parasitic upon coleopterous larvae and *solitary,* while *dorsata* is parasitic upon lepidopterous larvae and *gregarious.* To my mind the separation has no reason for being. From a practical standpoint, suppose that an exploring party captured a number of Braconidae and turned them over to some Hymenopterologist

for identification. Not knowing the host or the habits of any of the species, doubtless if *dorsata* and *mellitor* were present, he could not do otherwise than consider them identical and as far as naming them is concerned it would be a matter of history only. Or, if he thought it was really true that a difference in habit mattered here, he would be unable to decide which is which. But this argument concerns practice only and inconvenience and trouble in taxonomy must be courted rather than avoided if there is a question of truth to be decided.

There can be no doubt that fundamental variation at first, in many cases at least, is psychic—the energy varies before the substance and is infinitely more variable than the latter. This psychic variation is inherited and forms habits and instincts as in the insects. In simple forms of life, the difference in habit is not expressed morphologically as much as in more complex forms, so that as we descend it becomes increasingly more difficult to separate species morphologically and a resort is made to their chemical nature and habits. But in insects this is not true. The psychic variations may finally become expressed morphologically and it is not until this is done that a specific difference arises. Keeping in mind the accepted meaning of *species,* we can point to many cases of adaptive habit in various species of insects. It is common and nowhere else more so than with insect parasites. A parasite of necessity has to adapt itself to the size of its host and I have no doubt that the gregarious habit of the Bracon on lepidopterous larvae is a case of this kind (obviously the difference in host has no bearing on the matter). Even the authors cited support my contention, for on page 66 (*l. c.*) occurs this sentence: "It appears possible that the constantly changing factors of nature cause the various species to be continually adjusting their habits to new environments and new hosts." And they cite examples of the adjustment to new hosts. An adaptive habit is certainly not a basis for specific differentiation and we certainly must consider the social or non-social habit of the Bracon as an adaptation to the size of its host. Even were it true that poly-embryony occurred

with the species and that it was proved able to alternate this mode of reproduction with the ordinary kind according to the nature of its host, this though a wonderful fact, would certain-not form a basis for specific differentiation. For the very definition of *species* would make it necessary that neither *mellitor* nor *dorsata* bred with one another or were identical in hereditary elements; for if this is so, the habits may vary infinitely without changing their essential specific unity. We know of so many instances in insects of great variability in habit of *known* specific units, and of so few or none where *known* specific units do not vary, that it would be extremely hazardous, to say the least, to base two species on the mere fact that a difference in habit was present. Before such a thing is done it will be necessary to change the definition of a species, and even that will not eliminate the fact that in nature there occur such things as a population of more or less definitely limited individuals which are all descendants from a common stock.

Seasonal Notes on Insects in Virginia.

At Blacksburg in 1901, butterflies had almost stopped flying by October 12th; by the 25th Diptera and Hymenoptera on the wing were becoming scarce; on November 9, however, swarms of Mycetophilidae were observed. Then Orthoptera were conspicuous; *Thyridopteryx* and *Callosamia* had cocooned. On March 20th following, the first butterly was observed, probably *Vanessa antiopa.* On April 11, the eggs of aphids were hatching; an adult of *V. antiopa* was observed and also several moths. On April 18, *Diastrophus nebulosus* was emerging (indoors) and the eggs of *Malacosoma americana* were hatching, the nests now appearing like cobwebs; the caterpillars then were about 6 mm. long and were feeding upon just opening buds. On April 22, *Carpocapsa pomonella* was observed depositing eggs (Professor Alwood). On the 30th, *Pieris rapae* was ovipositing onto young cabbage plants (2-3 inches high); eggs of *Coccinellidae* observed May 2, 1902, *Actias luna* had not emerged; *Malacosoma americana* now conspicuous in their nests. The following day, adult *Schisto-*

cerca americana were observed to be numerous in meadows, mating May 12; *Papilio turnus* observed on the wing. May 4, eggs of *Thyridopteryx ephemeraeformis* were hatching. May 13, *Nematus ribesii* was abundant in all stages of larval development on currants and gooseberries; Perlidae observed depositing eggs on grass stems along a stream. May 22, *Malocosoma* larvae full grown, cocooning on May 25. June 11, *Macrodactylus subspinosus* was present in numbers (since May 19). September 18, 1902, the larvae of *Ceratomia catalpae* were nearly full grown, pupating on September 22 and later. On March 14, 1902, an adult *Vanessa antiopa* was seen flying and a *Grapta;* pond life was then active.

References to Glossaries.

Some years ago in this journal (1905, pp. 105-108, 221-230), I gave a list of entomological glossaries and in 1902 I had commenced to write an entomological dictionary upon which I did a large amount of work before concluding that it was too much for one person to handle. A work of this kind is still badly needed and it will be necessary to consult all the vocabularies extant. The following references I find among my notes: Bull. 30, Univ. Montana, 1906, pp. 163-169. Frederick D. Chester, A Manual of Determinative Bacteriology, N. Y., 1901, pp. 381-386 (descriptive terms). Peter P. Good, A Materia Medica Animalia, Cambridge, Mass., 1833 (?), glossary of 54 pages. Glossary of Coccidae in second biennial Rep. Commissioners Horticulture of California, 1905-1906, p. 162. Eleanor A. Ormerod, A Textbook of Agricultural Entomology, London, 1892, edit. 2, pp. 229-231. Burt G. Wilder and Simon H. Gage, Anatomical Technology as Applied to the Domestic Cat., N. Y. and Chicago, 1882, pp. 10-45. Ed. André, Species des Hyménopterès d'Europe et d'Algérie enrichi &c., 1879, Beauve, tome premier, pp. CXLIX-CLXXXVII. These are but few.

Ptinobius dysphagae Ashmead, new species (Hym.).

In Entomological News, 1904, p. 300, I mention a chalcidoid parasite (supposedly) of *Dysphaga tenuipes* Hald. which had been identified as a new species of *Ptinobius* by William H. Ashmead and given the above name, from male specimens sent to him by myself from Blacksburg, Virginia, some time early in 1903. The species has never been described and is thus but a naked name. In order that the name should become valid, I give the following description of the species from

a specimen still in my possession, sent to me by Dr. Ashmead in 1903. It is a *Ptinobius* but the wings are not banded.

Male:—Length, about 4.25 mm. Dark metallic aeneous green, the wings hyaline, the abdomen, head, mesothorax and eyes with a soft, close, greyish yellow pile; vertex with coppery tinges, the abdomen darker, purplish black, its second segment green and glabrous. Venation, scape and pedicel, trochanters, knees, tips of tibiae and tarsi reddish brown. Hind femur somewhat swollen and with fine denticulation, distad with five teeth. Funicle and club black. Parapsidal furrows faint, half complete from cephalad. Postmarginal vein twice the length of the stigmal, three-fourths that of the marginal. Propodeum with a median carina and lateral carinae. Pronotum barely wider than long. *Sixth* segment of abdomen occupying more than the distal half of the surface, segment 2 deeply excavated at meson of caudal margin, exposing to view the extremely short third segment, the segments distad of 3 densely, pentagonally scaly, still denser on 6. Head and thorax finely, densely sculptured. Antennae 11-jointed, the club solid (though apparently obscurely 3-jointed). Funicle subcompressed, 7-jointed, the joints wider than long except the first; one large ring-joint which is slightly wider than long. Pedicel subglobate. Hind tibiae with two stout, unequal white spurs.

The specimen will be deposited into the collections of the United States National Museum as a type, and there should be several other males in the same collection but which I have not seen. (Accompanying the tagged specimens is a slide with first and third femora and the antennae.) The scape is darker above at tip. The front femur is distinctly swollen, obscurely denticulate beneath, more so above.

Geotaxis in Trichogramma minutum Riley (Hym.)

Once in 1904 I took a female of this species and placed it under a glass jar (10 x 10 cm.) over a clean sheet of white bristol board. The time was 5 P. M., and the jar was placed just in front of a window looking east and thus away from the direct source of light. The jar was nearly equally lighted on all sides. The insect immediately commenced to crawl up. After a second or two, the jar was inverted rather slowly but the upward motion of the insect continued, its course being gradually changed in a direction equal and opposite to that of the jar; thus, during the half revolution of the jar, the vertical movement of the *Trichogramma* was continued; when the jar

was half reversed, on its side, the insect was crawling up and around the side. When the reversal was complete, it was crawling toward the mouth of the jar and could easily have escaped. Obviously, its movements were geotactic. They were repeated as often as the jar was reversed. The side of the jar traversed was that turned toward the window.

This insect is often found on windows facing the light and then is always at the top of the pane, either resting there or else crawling upward as far as possible, falling down and repeating the same operation time after time. This is not only true for this species but for most of the species of its family, all or most of the Mymaridae and a very large number of other Chalcidoidea, Proctotrypoidea, Vespoidea, Apoidea and other Hymenoptera under similar conditions. A certain amount of positive phototaxis was also present, a turning toward greater brightness.

Diastrophus nebulosus (Hym.).

Galls of this species obtained at Annapolis, Maryland, March 17, 1901, were full of larvae; on April 8, the latter had pupated and emergence occurred late in April. Besides the cynipids *Ormyrus lobatus* Walker and a species of *Torymus* were reared, the identifications by Ashmead.

Trypeta solidaginis Fitch (Dip.).

A gall of this species taken from *Solidago* at Annapolis, Maryland, March 31, 1901, gave the adult on May the 9th following. The puparium is yellow, lighter between segments, that is the body is marked with alternating dark and lighter cross stripes. The gall measured over an inch. The adult was authoritatively identified by Coquillett.

Catolaccus Reared from a Gall (Hym.).

A species of *Catolaccus* was reared in May, 1901, from some cynipid gall on an unknown briar growing in a marsh at Annapolis, Maryland.

Cecidomyia farinosa Osten-Sacken in Maryland (Dip.).

About April 29, 1901, at Annapolis, I cut a twig containing a small yellow larva from a blackberry bush; the twig was swollen into an oval gall. The larva was taken out of the gall and placed into a watch glass, where it pupated on May 6 following; the pupa was yellow, turning to orange after several days and then to black when nearing ecdysis; the latter occurred on May 17 or after eleven days. Later, the galls were found to be common and usually to contain from three to four larvae The species was identified by William H. Ashmead.

Polygnotus Not an Egg-parasite of Cecidomyia (Hym.).

In Entomological News, XIX, p. 352, Russell and Hooker record a proctotrypoid as parasitic upon the eggs of their *Cecidomyia foliora.* Mr. H. L. Viereck identified the parasites as *Polygnotus* and later sent them to me. From their size it would seem a physical impossibility for them to be true egg-parasites of the Cecidomyia.

A Note on Limenitus ursula (Lep.).

Several larvae obtained from wild plum (Annapolis, Maryland) on May 7, 1901, pupated on May 12, the butterflies emerging after ten and a half to eleven days.

A Few Notes on Lixus concavus Say (Col.).

At Annapolis, Maryland, the eggs of this species were very common in the stems of dock (*Rumex*), the third week in May, 1901. After some watching, the following observation was made on the manner of oviposition.* When first seen, the female was excavating a cavity into the plant with her jaws, her head toward the ground. After about forty minutes she turned hastily about, fitted the tip of the abdomen into the cavity and apparently without any exertion the egg was laid, occupying about five seconds; the cavity was then closed, but in what manner was not noted. The male was close by the whole time, usually upon the female's back, but not participating in the work. Some of the dock plants bore as many as four eggs. On January 7 a full-grown larva was encountered two and a half inches below the egg-scar; eggs were then still abundant. On June 26, at Blacksburg, Virginia, the adults were observed on cultivated rhubarb and later many egg-scars were found along the stems containing eggs; but in none of these infested plants could larvae ever be found. A gummy substance exuded by the rhubarb plant was often found over the egg-scar. On January 25 adults were observed mating.

Identification of Specimens.

The following desire to be added to the list of those willing to determine material from North America in their respective groups. (See this volume of the NEWS, pages 33, 35 and 85 for further information and for directions for sending specimens).

HEMIPTERA.—*Pentatomidae*: Dayton Stoner, Iowa City, Iowa; *Corixidae*: J. F. Abbott, Washington University, St. Louis, Missouri.

HYMENOPTERA.—*Pompilidae* and *Philanthidae*: Nathan Banks, East Falls Church, Virginia.

NEUROPTEROID INSECTS (except Odonata).—Nathan Banks, East Falls Church, Virginia.

[*See Ent. News XXIII, pp. 401 and 474. ED.]

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., MARCH, 1915.

Reports of the Doings of Societies.

Some time ago a well-known entomologist stated that he considered the reports of the "doings of societies" in our entomological journals the least valuable part of the publications and that the space they occupied could be used to much better advantage for more important matter. We must confess that we had not previously looked upon these reports in that light, but on reflection came to the conclusion that, to a certain extent at least, he was correct.

Many of these communications, as published, are perfectly useless and convey no real information. They only cost money and waste valuable space. Their general type is something like this: Mr. X. made a communication *on the life history of certain Coleoptera and exhibited drawings of the early stages.* Mr. Y. *exhibited some curious Hemiptera from the Mountains of the Moon and spoke of their habits.* These communications led to a prolonged and general discussion among the members. Mr. Z. *exhibited specimens of Colias philodice which were more or less abundant during the season.* But why give examples—look into our journals and find plenty of things that waste good ink.

Even when they convey real information it is lost by the solid way of setting up the type. Each communication printed should be doubly leaded and the first word or two should begin in bold-faced type, and where possible the order of insects mentioned should be given. This would be of special advantage to the bibliographer who dislikes to wade through a lot of rubbish to get the essential thing. In addition, why should the man interested in a particular group of insects be compelled to wade through several pages of solid matter to find one or two things that he cares to read or wishes to record! It will be best to discontinue such methods and only publish statements that convey some knowledge of importance. Those verbal communications which are subsequently to be published should record facts of value, or, if only bare statements, they should not get beyond the "minute book."—H. S.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Change of Address.

Harry B. Weiss *to* 242 Raritan Ave., Highland Park, New Brunswick, New Jersey.

Change of Address.

The undersigned begs to announce that the Imperial Plant Quarantine Station has been recently organized and established under the control of the Department of Agriculture and Commerce, with its headquarters in Yokohama; and that he has been appointed the Director and the Chief Inspector of the same. The undersigned at the same time holds, as formerly, the position as the Entomologist for the Imperial Agricultural Experiment Station, Nishigahara, Tokyo.

It is kindly requested that all communications, including those that hitherto have been accustomed to be addressed to the Imperial Agricultural Experiment Station, be forwarded to the new address. It is furthermore kindly requested that all publications on the subject of entomology, and also specially on the plant quarantine work, be forwarded to the changed address.

S. I. KUWANA, Director, Imperial Plant Quarantine Station, and Entomologist, Imperial Agricultural Experiment Station, Yokohama, Japan.

A Parasite of the Cottonwood Borer Beetle (Col., Dip.).

While studying the effects of poison baits on grasshoppers in a grove of cottonwood trees in western Kansas, in the summer of 1913, the writer was impressed by the large number of dead cottonwood borer beetles (*Plectodera scalator* Fab.). Dead beetles were found at the bases of the trees and on the ground at distances varying from one to three feet away.

The conclusion was drawn at once that they had been poisoned by the bran mash spread over the ground for the grasshoppers.

It was to test the validity of this conclusion that a large number of the living and dead were brought to the laboratory and a Gutzeit test for arsenic applied. This gave negative results but in preparing them we found them to be parasitized.

All the remaining beetles were placed in breeding cages and over 90 per cent. of the beetles were found to be parasitized by a fly identified by Mr. W. R. Walton as *Sarcophaga vericauda* Coq., heretofore reared only from grasshoppers. *P. scalator* Fab. is thus given as a new host for this dipterous parasite.—H. B. HUNGERFORD, The University of Kansas, Lawrence, Kansas.

Meetings in Los Angeles.

The present Exposition year 1915, with the attractions in San Francisco and San Diego, will doubtless see many visiting entomologists in California who may wish to become personally acquainted with some of the local people interested in natural history; so the following announcements of meetings in Los Angeles may be of interest:

The Entomological Club meets on the first Thursday evening of each month in the Music Room of the Los Angeles Public Library, 9th floor of the Metropolitan Building, 5th and Broadway, at 8 o'clock. All entomologists are especially invited to be present.

The Biological Section of the Southern California Academy of Sciences meets in the Lecture Room in the same building on the first Tuesday evening of each month.

The Lorquin Natural History Club meets on the first Friday evening of each month at the homes of members. Visitors would be interested in this association of young naturalists; and the members would greatly appreciate their presence. Particulars of the place of meeting may be had from the undersigned.—FORDYCE GRINNELL, JR., Southwest Museum, Museum Hill, Los Angeles, California.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—The Canadian Entomologist. **5**—Psyche. **7**—Bureau of Entomology, U. S. Department of Agriculture, Washington. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **15**—Biologia Centrali-Americana, Zoology, London. **18**—Ottawa Naturalist. **50**—Proceedings of the U. S. National Museum. **68**—Science, New York. **84**—Entomologische Rundschau. **89**—Zoologische Jahrbucher, Jena. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **94**—"Das Thierreich," herausgegeben von d. Deutschen zoologischen Gesellschaft, Berlin. **97**—Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **143**—Ohio Naturalist. **186**—Journal of Economic Biology, London. **189**—Journal of Entomology and Zoology, Claremont, Calif. **198**—Biological Bulletin of the Marine Biological Laboratory, Woods Hole.

378—Annales, Societe Zoologique Suisse et du Museum d'Histoire de Geneve, Revue Suisse de Zoologie. **324**—Journal of Animal Behavior, Cambridge. **355**—Smithsonian Institution Report, Washington, D. C. **411**—Bulletin of the Brooklyn Entomological Society. **447**—Journal of Agricultural Research, Washington. **477**—The American Journal of Tropical Diseases and Preventive Medicine, New Orleans. **496**—Memoirs, National Academy of Sciences, Washington. **497**—Zeitschrift fur angewandte Entomologie. Hrsg. K. Escherich u. F. Schwangart, Berlin. **498**—U. S. Public Health Service, Hygienic Laboratory, Washington.

GENERAL SUBJECT. Berlese, A.—Gli Insetti, Vol. II, Fasc. 9-10, pp. 241-304. **Buckland, J.**—The value of birds to man, **355,** 1913, 439-58. **Criddle, N.**—Popular and economic entomology. Some inhabitants of a sand plain in June, **4,** 1915, 24-30. **Johnson, J. W.**—A contribution to the biology of sewage disposal, Pt. II, **186,** ix, 127-164. **Kershaw, G. B.**—Formaldehyde useful in setting insects, **9,** 1915, 19-20. **Przibram, H.**—Experimental zoology, Pts. 3-5. [Leipzig und Wien. Franz Deuticke, 1910-1914.] **Sears, P. B.**—The insect galls of Cedar Point and vicinity, **143,** xv, 377-92.

PHYSIOLOGY AND EMBRYOLOGY. Hegner, R. W.—The germ-cell cycle in animals. [New York. The Macmillan Company, 1914.] 346 pp. **Kunneth, F.**—Die stigmenersorgung des insektenthorax, **97,** cxii, 70-92. **Loeb, J.**—The simplest constituents required for growth and the completion of the life cycle in an insect (Drosophila), **68,** xli, 169-70. **Painter, J. S.**—Spermatogenesis in spiders, **89,** xxxviii, Abt. f. Anat., 509-76. **Wieman, H. L.**—Observations on the spermatogenesis of the gall-fly, Dryophanta erinacei, **198,** xxviii, 34-46.

MEDICAL. Knab & Busck.—Mosquitoes and sewage disposal, **477,** ii, 333-38. **Liceaga, E.**—How war has been waged in Mexico against the mosquito, **477,** ii, 118-23. **McShane, A.**—The Phlebotomus papatach, the transmitter of the "Three days fever," **477,** i, 815-18. **Wheeler, W. M.**—Ants and bees as carriers of pathogenic micro-organisms, **477,** ii, 160-68.

ARACHNIDA, ETC. Emerton, J. H.—Geographical distribution of spiders in New England. [Appalachia], xiii, No. 2, 143-59. **Moles, M. M.**—Pseudoscorpions in the Claremont-Laguna region. [Chelanops serratus]; A new Pseudoscorpion from California [Atemnus hirsutus], **189,** vi, 187-97; 203.

NEUROPTERA, ETC. Waterston, J.—On two n. sps. of Mallophaga: Menacanthus balfouri and Myrsidea victrix, from Columbia, **8,** 1915, 12-16.

ORTHOPTERA. **Davis, W. T.**—A new sp. of Atlanticus from the mountains of Georgia and North Carolina [A. monticola], **411**, ix, 104-6. **Mann, W. M.**—(See under Coleoptera.)

HEMIPTERA. **de la Torre Bueno, J. R.**—Phototropism in Heteroptera, **411**, ix, 90-6. **Wildermuth, V. L.**—Three-cornered alfalfa hopper (Stictocephala festina), **447**, iii, 343-62.

LEPIDOPTERA. **Glaser, R. W.**—The bacterial diseases of caterpillars, **5**, xxi, 184-90. **Hasebrock, K.**—Ueber die entstehung des neuzeitlichen melanismus der schmetterlinge und die bedeutung der Hamburger formen fur dessen ergrundung, **89**, xxxvii, Abt. f. Syst., 567-600. **Prell, H.**—Die beteiligung des darms an der entfaltung der flugel bei schmetterlingen, **92**, x, 345-49. **Rattray, R. H.**—Notes on the larval and pupal stages in some of the Sesiidae, **9**, 1915, 9-12. **Saunders, A. P.**—The cotton worm moth, **68**, xli, 65. **Seitz, A.**—Topographie des schmetterlingsflugels, **84**, xxxi, 113-14.

Barnes & McDunnough.—A new genus and a n. sp. of L. from Arizona, **4**, 1915, 20-2. **Gibson, A.**—Notes on the preparatory stages of Proserpinus flavofasciata ulalume, **18**, 1915, 143-4. **Packard, A. S.**—Monograph of the Bombycine moths of North America. Part III. Edited by T. D. A. Cockerell. [Two new names.] **496**, xii, 276, pp. **Swett, L. W.**—Geometrid Notes—Revision of the genus Hydriomena, group with long palpi, **4**, 1915, 9-11 (cont.). **Walsingham, Lord.**—Lepidoptera, Heterocera [many new sps.], **15**, iv, 281-392.

DIPTERA. **Bromley, S. W.**—Asilids and their prey, **5**, xxi, 192-8. **Hewitt, C. G.**—The house-fly. Its structure, habits, development, relation to disease and control [Cambridge: at the University Press, 1914], 382 pp. **McDermott, F. A.**—Note on the reaction of the house-fly to air currents, **324**, v, 73-4.

..**Cockerell, T. D. A.**—A new dipterous gall on Stanleya [Perrisia stanleyae], **189**, vi, 240-1. **Felt, E. P.**—New genera and sps. of gall midges [2 new sps.], **50**, xlviii, 195-211. **Fox, C.**—Some new Siphonaptera [6 new species]; The taxonomic value of the copulatory organs of the females in the order Siphonaptera, **498**, Bul. 97, 7-17; 19-22. **Malloch, J. R.**—North American D. [4 new], **4**, 1915, 12-16. **Schmitz, H.**—Die myrmecophilen Phoriden der Wasmann'schen sammlung, **89**, xxxvii, Abt. f. Syst., 509-66.

COLEOPTERA. **Barber, H. S.**—Prothetely or semi-pupal stage in Lopheros fraternus, **5**, xxi, 190-2. **Chapman, R. N.**—Observations on the life history of Agrilus bilineatus, **447**, iii, 283-94. **Dow, R. P.**—The Russian masters in C., **411**, ix, 96-101. **Dury, C.**—

What I found under a pile of grass, **411,** ix, 101-3. **Riehn, H.**—Erfahrungen beim kodern von kaefern im winter, **92,** x, 328-21.

Hopkins, A. D.—Preliminary classification of the superfamily Scolytoidea, **7,** Tech. Ser., No. 17, 165-232. **Mann, W. M.**—Some Myrmecophilous insects from Mexico. [Orthoptera: 2 new names; Coleoptera: 7 new names; Hymenoptera: 5 new names]. **5,** xxi, 171-84. **Payne, O. G. M.**—Notes on Telephorus rufus and its varieties, **186,** ix, 165-8. **Spaeth, F.**—Coleopterorum catalogus, Pars 62: Chrysomelidae: 16, Cassidinae, 182 pp.

HYMENOPTERA. Cornetz, V.—Observations nocturnes de trajets de fourmis, **278,** xxii, 581-95. **Frisch, K. v.**—Der farbensinn und formensinn der biene, **89,** xxxv, Abt. f. Allgem. Zool., 1-183. **Strindberg, H.**—Zur kenntnis der hymenopteren entwicklung. Vespa vulgaris nebst einigen bemerkungen ueber die entwicklung von Trachusa serratulae, **97,** cxii, 1-47.

Beutenmuller, W.—Notes on the genus Rhodites, with descriptions of n. sps. [2 new], **411,** ix, 87-90. **Kieffer, J. J.**—Bethylidae; Serphidae (= Proctotrupidae) et Calliceratidae (= Ceraphronidae). [Bethylidae, 3 n. gen.; Calliceratidae, 2 n. gen.], **94,** Lief. 41, 42. **Mann, W. M.**—(See under Coleoptera.) **Schmiedeknecht, O.**—Die Ichneumonidengattung Pimpla, **497,** i, 396-78.

Doings of Societies.

NEWARK ENTOMOLOGICAL SOCIETY

Meeting of January 12, 1913, in Newark Free Public Library. President Buchholz in the chair, twelve members present. Mr. John Pfeuffer, of Irvington, was elected a member. Mr. Rummel mentioned taking a *Papilio turnus* form between *turnus* and *glaucus* in Elizabeth, August 5, and Mr. Brehme stated the fact that he saw moths flying at light in New Brunswick on Jan. 6. Mr. Lemmer stated that he had bred *Anomis erosa* from a larva found on hollyhock in Irvington about November 10. Mr. Grossbeck showed sixty interesting photographs of scenery taken by himself and Mr. Davis in Florida.

Meeting of February 9, 1913, in the Free Public Library. President Buchholz in the chair, fifteen members present.

Through Mr. Buchholz, Dr. R. E. Kuntze presented to the society eight papers on Entomology and other sciences.

Meeting of April 13, 1913, in the Free Public Library. President Buchholz in the chair, ten members present. Dr. Kuntze presented to the society a paper on Entomological Materia Medica, which was accepted with thanks. Mr. Doll reported capturing Noctuidae by beating oak branches which did not lose their leaves last fall. Mr. Rummel very kindly presented five volumes of Entomological News to the society.

Meeting of October 12, 1913, in the Free Public Library. Vice-President Henry H. Brehme in the chair, eleven members present, and Mr. Hampson a visitor. Mr. Rummel showed a box of moths, mainly *Papaipema*. Mr. Lemmer reported the capture of the following: *Acronycta radcliffei*, Orange Mts., May 4; *Cleora areataria* (Broadwell), Elizabeth, April 10; *Cleora indicataria*, Orange Mts., July 5; *Misogada unicolor*, Elizabeth, August 4; *Lophodonta ferruginea*, Elizabeth, June 22; *Amolita fessa*, Irvington, July 5; *Cucullia convexipennis*, Elizabeth, August 8; and *Epimecis virginaria* (two black males), Elizabeth, June.

Meeting of November 13, 1913, in the Free Public Library. Vice-President Henry H. Brehme in the chair, six members present. Mr. Rummel reported progress regarding the collection for the Newark Museum Association.

Meeting of December 14, 1913, in the Free Public Library. President Buchholz in the chair, eleven members present. Mr. Rummel showed six cases of insects arranged and labelled by him for the Newark Museum Association. Mr. Grossbeck was made a corresponding member. The following officers for the year 1914 were elected: President, Otto Buchholz, re-elected: Vice-President, Henry H. Brehme, re-elected; Secretary, Frederick Lemmer, re-elected; Financial Secretary, T.

David Mayfield, re-elected; Treasurer, Geo. J. Keller, re-elected; Librarian, Louis Doerfel, re-elected; Curator: Lepidoptera, Chas. Rummel, re-elected; Coleoptera and other Orders, Ed. Bischoff, re-elected; Trustee for three years, John Angelman.

Meeting of February 8, 1914, in the Free Public Library. President Buchholz in the chair, twelve members present. Mr. H. B. Weiss spoke on the insects taken on nursery stock imported into New Jersey during 1913 and on the small percentage of destructive forms in New Jersey considering the fact that 10,385 species are named in the New Jersey list.

Meeting of March 8, 1914, in the Free Public Library. President Buchholz in the chair, twelve members present. Through Mr. Brehme, Dr. Barnes presented to the society "Contributions to the Nat. Hist. of the Lepidoptera of N. America," Vol. I, Nos. 1-6, Vol. II, Nos. 1-4. Mr. Weiss presented a French publication on the Hemiptera. Mr. W. P. Holt was elected a member. Mr. Herman H. Brehme read an interesting paper on "Insects and Their Relation to Plants as Benefactors," and Mr. Weiss, a paper on "Three Imported Insects Occurring in New Jersey." He also showed Japanese hemlock leaves infested by *Aspidiotus tsugae* Marlatt.

Meeting of April 12, 1914, in the Free Public Library. President Buchholz in the chair, thirteen members present; visitor, Mr. Erhard, from Brooklyn. Mr. Rummel mentioned the taking of *Feralia jocosa* and *Copipanolis cubilis*, April, 1914. Mr. Weiss then spoke on "Old Ideas and Other Facts About Insects."

Meeting of November 8, 1914, in the Free Public Library. President Buchholz in the chair, seven members present. Mr. Rummel showed several caterpillars, especially *Apantesis virguncula*, and a box of Lepidoptera. Mr. Weiss showed all stages of the Florida Fern Caterpillar, *Callopistria floridensis*,

which was doing considerable damage to ferns in greenhouses at Riverton and Rutherford. He also mentioned the taking of a single male Gypsy moth at Rutherford on August 1, by M. H. Mead, of Passaic.

Meeting of December 13, 1914, in the Free Public Library. Vice-President Brehme in the chair, ten members present. The resignation of Geo. Franck, of Brooklyn, was accepted. Dr. Barnes, through Mr. Herman H. Brehme, presented to the society "Contrib. to Nat. His. of the Lep. of N. A.," Vol. 2, No. 5. Mr. Weiss spoke on the relations of insects to animals, mentioning the life histories of the different bot and biting flies. He showed specimens of some species particularly injurious to animals. The following officers were elected for the year 1915: President, Otto Buchholz, re-elected; Vice-President, Henry H. Brehme, re-elected; Secretary, Harry B. Weiss; Financial Secretary, T. D. Mayfield, re-elected; Treasurer, Geo. J. Keller, re-elected; Curator, Chas. Rummel, re-elected; Librarian, L. Doerfel, re-elected; Trustee for three years, Wm. Erhard.

FREDERICK LEMMER, *Secretary.*

AMERICAN ENTOMOLOGICAL SOCIETY.

Meeting of October 22, 1914. Dr. Calvert, President, in the chair; ten persons present.

Mr. Laurent presented specimens illustrating stages in the life-history of *Leucania unipuncta* (Lep.) and read notes on the appearance of the insect and discussed the methods of repelling it.

Mr. Rehn exhibited some very large and curious Phasmidae from New Guinea.

Mr. Hornig exhibited a mount showing the life-history of *Eriopus floridensis* (Lep.).

Mr. Laurent exhibited a female *Papilio* (Lep.) captured at Mt. Airy, Philadelphia, on July 30th of this year. The specimen approaches nearer to *Papilio glaucus* than it does to the

variety *turnus*. The scales on the wings are a mixture of both black and yellow, the black scales predominating. He also exhibited a male of *Pamphila campestris* (Lep.) captured at Mt. Airy, Philadelphia, on October 17th. The speaker stated that to the best of his knowledge this was the third specimen recorded from the vicinity of Philadelphia. The date of capture, October 17th, was unusual.

Mr. Williams discussed the value of genitalic characters in the genus *Lycaena* (Lep.) and exhibited drawings of the genitalia of a number of species.

Dr. Calvert exhibited colored drawings made from life showing the difference in the eye coloring of the dragonflies *Protoneura amatoria* and *Argia oenea* (Odon.).

E. T. CRESSON, JR., *Secy. pro tem.*

Meeting of December 12, 1914. Dr. Calvert presided; eight persons present.

The following were elected officers to serve for 1915: *President,* Philip P. Calvert; *Vice-President,* H. W. Wenzel; *Treasurer,* E. T. Cresson; *Curator,* Henry Skinner; *Librarian,* Ezra T. Cresson, Jr.; *Corresponding Secretary,* J. A. G. Rehn; *Recording Secretary,* Henry Skinner.

HENRY SKINNER, *Rec. Secy.*

ENTOMOLOGICAL SECTION, ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

Meeting of November 19, 1914. Mr. Philip Laurent, Director, presided; thirteen persons present.

Dr. Skinner exhibited an interesting aberration of *Argynnis aphrodite* (Lep.) taken at Cresco, Pa., August 2, 1914, by Mr. F. M. Jones. The upper side is largely melanic and the silver spots below coalesced.

Mr. Daecke spoke of finding a geometrid larva (Lep.) in great abundance at Hunters Run, Pa., on July 11. He supposed the species to be *Zerene catenaria* and said the larvae feed on oak, sassafras, willow, maple, Jersey tea, indigo, etc.

Dr. Calvert exhibited a slide of the reproductive organs of a

female cricket, and the spermatophore. The curious method of fertilization was described.

Mr. Laurent said the larvae of *Hemileuca maia* (Lep.), when full grown, are from 2¼ to 2¾ inches in length. The larvae he reared emerged as imagos in October.

Mr. Wm. C. Thompson was elected an Associate of the Section.

Meeting of December 12, 1914. Mr. Philip Laurent, Director, presided; eight persons present.

Mr. E. T. Cresson, Jr., spoke of the methods of separating some genera in Acalyptrate Diptera. Presence or absence of post-vertical bristles was found to be of absolute value to separate two genera.

The following persons were elected to serve as officers for 1915: *Director,* Philip Laurent; *Vice-Director,* H. W. Wenzel; *Treasurer,* E. T. Cresson; *Conservator,* Henry Skinner; *Secretary,* J. A. G. Rehn; *Recorder,* Henry Skinner; *Publication Committee,* E. T. Cresson and E. T. Cresson, Jr.

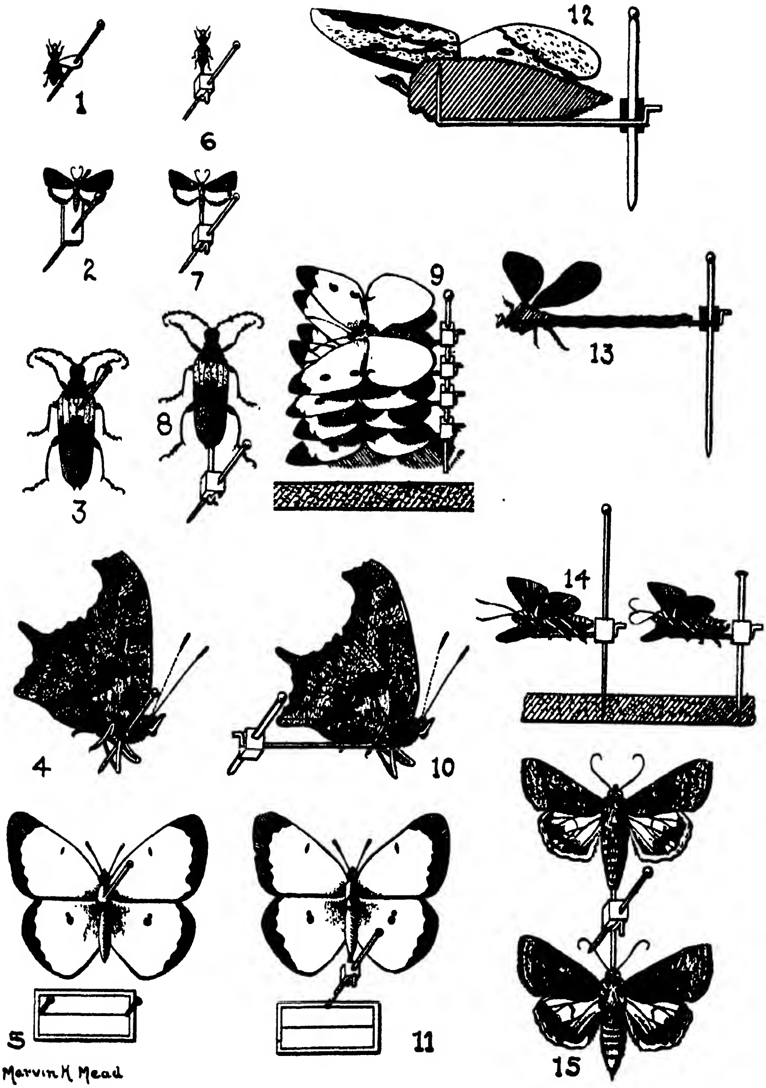
Meeting of January 28, 1915. Mr. Philip Laurent, Director, presided; twelve persons present.

Dr. Calvert described the differences in the dimorphic females of *Ischnura verticalis* Say (Odon.). (See February NEWS, pp. 56-68.)

Mr. Rehn made a few remarks on the species of the Orthopterous genus *Atlanticus,* all the forms of which were exhibited. An intensive study being made by the speaker and Mr. Hebard has brought out the fact that but a portion of the species were properly differentiated in the past. The important features found to be diagnostic of the species were discussed.

Mr. Williams said he had made some genitalic mounts of genera allied to *Lycaena* (Lep.) and considered the aedoeagus often showed good generic characters. He said some of the genera based on color, maculation and other slight differences were not valid.

H. SKINNER, *Recorder.*



A NEW PIN—WEISS.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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CONTENTS:

A New Pin for Mounting Insects.

By HARRY B. WEISS, New Brunswick, New Jersey.

(Plate V)

On March 17, 1914, there was issued to Mr. Marvin H. Mead, of Passaic, N. J., by the United States Patent Office, a patent covering certain improvements in mounts for specimens. These improvements should not be without interest to those engaged in entomological work requiring the care, mounting or exhibition of insects.

Briefly, the apparatus consists of a vertically supported pin bearing a small cube of cork. Through this cork runs a horizontal support having, at its distal end, a prong which is thrust into the ventral surface of the thorax. The opposite end of this horizontal support after it leaves the cork is bent to form a little crank, by means of which the specimen can be readily turned, exposing all parts of its surface for inspec-

tion. In addition this support prevents the abdomen from drooping in the process of drying (See Plate V, figures 12 and 13).

The accompanying plate V illustrates the advantages to be derived from utilizing a mount of this kind. In addition to the specimen being rotatable about a longitudinal axis, the dorsal surface of the thorax remains intact and one has an unobstructed view of the insect. The specimen can also be raised or lowered on the vertical pin, thereby eliminating one of the great disadvantages of exchanging mounted specimens (See figure 14). Another advantage is that a number of specimens can be mounted on a single main support in the area ordinarily occupied by one specimen. In this manner, several thousand specimens can be made accessible in the area usually required by several hundred. This is of considerable advantage in shipping or moving collections or storing mounted duplicates (See figure 9).

Long-bodied insects are mounted as shown in figure 13, the horizontal shaft acting as a support and replacing such supports as silver wires and bristles. Pairs can be mounted in tandem or side by side on a single main support, thereby facilitating comparison (See figure 15).

Extra label pins are not required when this new pin is used, inasmuch as the vertical pin can carry a label that will not be obscured by the insect (See figure 11). In moving specimens from one case to another both label and insect are carried in one operation. Lepidoptera are spread in the usual way and the inventor claims that it requires no additional time to mount insects on this pin after one has been shown the simple method of using it. It is readily adaptable for all sizes of insects and certainly deserves more than passing attention from entomologists. Figures 1 to 5 show the old methods of pinning and figures 6 to 15 the improved methods.

[An exhibit of insects mounted on these new pins was shown in connection with the annual meeting of the Entomological Society of America at Philadelphia in the closing days of last December. As the method aroused our interest and as only a brief account of Mr. Mead's pin has been published (Journ. N. Y. Ent. Soc. xxii, 76), we requested Mr. Weiss to describe it. We are informed that the pins can be obtained from Mr. Mead at 382 River Drive, Passaic Park, New Jersey. —Ed.]

A New Parasite of the Chinch Bug Egg (Hym.).

By JAMES W. McCOLLOCH, Assistant Entomologist, and H. YUASA, Student Assistant, Kansas State Agricultural College and Experiment Station.

During the summer of 1914, the Department of Entomology of the Kansas State Agricultural College carried on an extensive investigation of the life history of the chinch bug egg parasite (*Eumicrosoma benefica* Gahan). In the course of this work between seventy-five thousand and one hundred thousand chinch bug eggs were collected in the field to determine the percentage of parasitism and for use in the life history work. These eggs were collected regularly during the entire summer and were separated into lots of from ten to fifty and kept in small vials where they were examined daily. On August 4th a small, light greenish, parasite was found in a vial of eggs collected July 27th from crab grass. A careful examination of the eggs in the vial showed that one of them had a small round hole cut in the side of it. This was entirely different from the emergence holes cut by either the chinch bug or *Eumicrosoma benefica* and left no question as to where this parasite had come from. (Fig 1.) The egg from which it emerged was attached to another chinch bug egg from which an *Eumicrosoma benefica* emerged. (Fig. 2.) On August 10th another one of these parasites was bred from a chinch bug egg collected from crab grass on August 1st. This collection was made from a different field than the one of July 27th.

One of the projects under the life history work on *Eumicrosoma benefica* was to determine whether it had any host other than the chinch bug egg. Collections were made of all kinds of eggs found in the habitat of the chinch bug and its parasites. In these collections large numbers of eggs, which were thought to be eggs of a leaf-hopper, were taken and in nearly every case they were parasitized by this same greenish parasite. The exit hole in these eggs was the same as that in the chinch bug egg. (Fig. 3.)

A few specimens of this parasite were sent to Mr. A. B. Gahan, entomological assistant, United States Bureau of Entomology, and he determined them to be *Abella subflava* Girault. In commenting on his determination Mr. Ga-

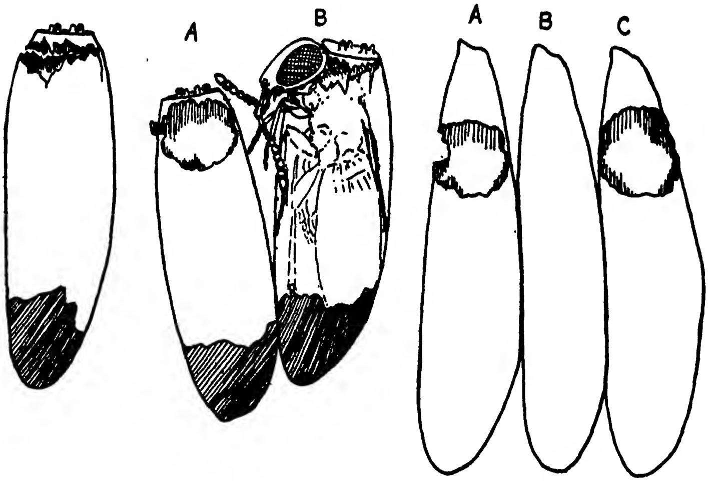


FIG. 1. FIG. 2. FIG. 3.

Fig. 1.—Chinch bug egg showing exit hole of *Eumicrosoma benefica*. Greatly enlarged.
Fig. 2.—Two chinch bug eggs deposited together. (A) shows exit hole of *Abella subflava*. (B) shows an adult *Eumicrosoma benefica* emerging from egg. Greatly enlarged.
Fig. 3.—Eggs from which *Abella subflava* were bred in large numbers. Probably eggs of a leaf-hopper. (A and C) show the exit holes of *A. subflava*. Greatly enlarged.

han says, "According to Girault this species occurs widely distributed in the United States and also in Australia. He says that it is parasitic on the eggs of a Jassid that infests wheat straw. Your specimens agree nicely in the generic characters with the types of Girault's species and I was unable to find any character that would indicate a different species although your specimens appear a little lighter in color. I attribute this to their having been in alcohol. I showed the specimens to Mr. J. C. Crawford and he agrees with me in the determination."

A number of attempts have been made to carry the life history of this parasite through on chinch bug eggs but in all cases the results have been negative. In two cases there was

some indication of parasitism but the eggs failed to give up any parasites. When placed in the presence of chinch bug eggs the females show but slight interest in the eggs and do not become excited when they come in contact with them. The length of the adult life has been found to range from seven to fourteen days when fed on sweetened water.

As a factor in the natural control of the chinch bug, *Abella subflava* plays a very insignificant part. The fact that only two parasites have been reared from the large number of eggs examined seems to indicate that parasitism of chinch bug eggs by it is accidental rather than natural.

Preliminary List of New Jersey Acarina.

By Harry B. Weiss, New Brunswick, N. J.

The arrangement of the following list is in accordance with Banks' Catalog of the Acarina or Mites of the United States, Proc. U. S. Nat. Mus. 1907, Vol. 32. The list is of course very incomplete, but it is hoped by collections to add further to our knowledge of the Acarian fauna of the state. My thanks are due Mr. Nathan Banks for determinations made in this group.

Family Tetranychidae.

Bryobia Koch.

B. pratensis Garman. Greenloch, Moorestown, Englishtown and other parts of the state. The Clover Mite. Feeds on clover and foliage of fruit trees.

Tetranychus Dufour.

T. bicolor Bks. Westfield, 7-22-14, and other parts of state. Taken on apple, silver maple and other plants.

T. bimaculatus Harvey. Throughout the state. The common "red spider" of greenhouses. Attacks roses, carnations, palms, violets and many other plants grown under glass. Quite a pest some seasons on various outdoor plants.

T. pilosus. Newark, on fruit trees. E. L. Dickerson.

Family Trombidiidae.

Microtrombidium Haller.

M. locustarum Walsh. Occurs upon eggs, nymphs and adults of grasshoppers.

Family IXODIDAE.

Ixodes Latreille.

I. cookei Pack. New Jersey, (Tech. Series No. 15, U. S. Bur. Ent.) Common on small mammals.

Haemaphysalis Koch.

H. chordeilis Pack. The bird tick. Undoubtedly occurs in New Jersey.

H. leporis-palustris Pack. Occurs on rabbits.

Amblyomma Koch.

A. americanum Linn. Undoubtedly occurs in New Jersey. The Lone Star Tick. Has a wide range of hosts.

Dermacentor Koch.

D. variabilis Say. Milltown, Glassboro, Bridgeton, southern New Jersey. The dog or wood tick.

Family GAMASIDAE.

Dermanyssus Duges.

D. gallinae Redi. New Brunswick, Hammonton, Vineland, Bridgeton and other parts of the state. The chicken mite.

Celaenopsis Berlese.

C. latus Bks. Anglesea.

Laelaps Koch.

L. multispinosus Bks. New Jersey. On muskrat. May.

Macrocheles Latreille.

M. badius Koch. College farm, May 19, 1914. Taken on *Scatophaga stercoraria* Linn. C. H. Richardson. Also common in manure.

M. marginatus Herm. Nutley, 7-22-14. On *Allorhina nitida*. H. B. W.

Family ORIBATIDAE.

Nothrus Koch.

N. truncatus Bks. Anglesea.

Family TARSONEMIDAE.

Tarsonemus Canestrini.

T. pallidus Bks. Hoboken. On chrysanthemums in greenhouse. J. B. Smith.

T. waitei Bks. Undoubtedly occurs in New Jersey. The peach bud mite. Attacks terminal buds or shoots, usually on nursery trees.

Pediculoides Targioni-Tozzetti.

P. ventricosus Newport. New Brunswick, southern New Jersey. Attacks larvae of Angoumois grain moth and *Bruchus quadrimaculatus*. Also man causing a skin eruption.

Pediculopsis

P. graminum Reuter. Manasquan, Bergenfield, College Farm, in greenhouses. In connection with bud-rot of carnations. H. B. Weiss.

Family Tyroglyphidae.

Tyroglyphus Latreille.

T. farinae De Geer. Infests flour and stored foods.

T. lintneri Osb. Orange, Trenton, Freehold. The mushroom mite. Sometimes destructive.

Rhizoglyphus Claparede.

R. phylloxerae Riley. New Jersey. In asparagus shoots.

Family Sarcoptidae.

Cnemidocoptes Furstenberg.

C. gallinae Railliet. Vineland, Glassboro. The "depluming mite," burrows near base of feathers.

C. mutans Robin. The "itch mite" of chickens. Attacks legs, comb and neck. Responsible for the so-called "scaly leg." Vineland, Bridgeton.

Family Eriophyidae.

Eriophyes Siebold.

E. abnormis Garman. Forms pouch-like gall on upper side of leaf of *Tilia americana.* Occurs in New Jersey. M. T. Cook.

E. crumena Riley. Small tapering gall on upper side of leaves of *A. saccharum.* Different parts of New Jersey. M. T. Cook.

E. aenigma Walsh. Somerville, Keansburg and other parts of state. H. B. W. Occurs on willows in early summer. Irregular woolly tangles of leaf or flower buds.

E. amelanchieri Steb. Elizabeth. On *Amelanchier canadensis.* The june-berry mite gall.

E. avellanae Jarvis. Norwood, Westwood. H. B. W. The hazelnut bud-gall.

E. betulae Steb. Hillsdale, Woodcliff Lake. Bud gall on yellow birch.

E. caulis Walsh. Galls occur on petiole, ribs and large veins of black walnut. Occurs in New Jersey. M. T. Cook.

E. dentatae Steb. Mount Holly. H. B. W. On *Castanea dentata.*

E. pyri Pgst. Throughout the state, on pear and sometimes apple, forming reddish blisters on leaves. Sometimes destructive. The pear leaf blister mite.

E. quadripedes Shimer. Westfield, Imlaystown, Englewood and other parts of state. Pouch-like galls on upper sides of leaves of silver maple.

E. querci Garman. In various parts of the state. The oak mite gall. Occurs on scrub oak, white oak, chestnut oak.

E. rhois Steb. New Brunswick, Highland Park, Nutley, Englishtown and other parts of state. On upper and lower surfaces of *Rhus radicans*. Poison ivy mite gall.

E. salicicola Garman. New Brunswick, Somerville and other parts of state. Galls on upper surface of willow leaves.

E. semen Walsh. New Brunswick, other parts of state. Galls on upper and lower surfaces of willow leaves.

E. serotinae Beut. Highland Park, M. T. Cook. Common gall on wild cherry.

E. ulmi Garman. Elizabeth, Westfield. Galls on upper surface of leaves of *Ulmus americana*.

E. viburni Steb. Elizabeth. Galls on leaves of *Viburnum dentatum*.

E. ferruginea Farlow. Beech mite-gall. On *Fagus americana*. New Brunswick. T. J. Headlee.

E. phlocopotes. Forms galls on plum. Trenton, October 15, 1913. New Jersey Experiment Station Report, 1913.

A New Genus of Canestriniidae (Acari.).

By NATHAN BANKS, East Falls Church, Virginia.

Dr. Roland Thaxter has recently sent me what is to me the most remarkable mite. It will form a new genus in the Canestriniidae; mites that are usually found on beetles; they are genuine parasites, but do little harm to their hosts.

Acrotocarus n. gen.

A canestriniid; body in front with a T-shaped process, the front part of which bears a large, bilobed, hyaline membrane. Legs short, coxæ radiately arranged; mouth parts sunken within an oral cavity under the anterior edge of the body.

Type—The following new species.

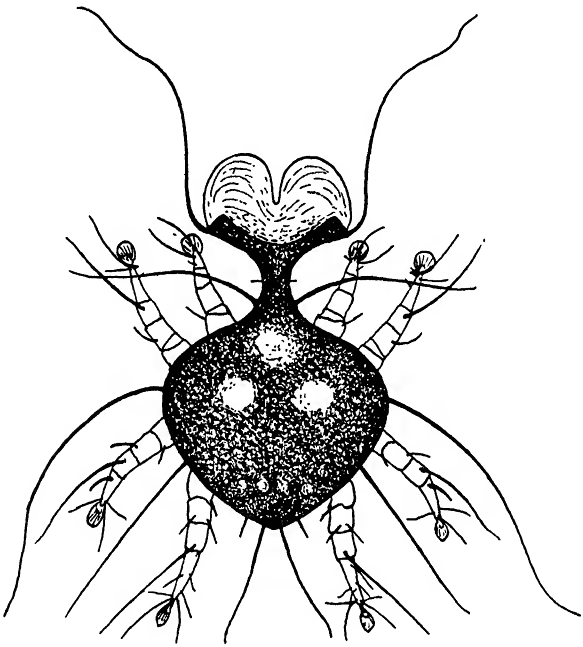
Acrotocarus mirabilis n. sp.

Body dark, legs pale, dorsum with two large pale spots in the middle and a fainter one in front of them, near tip four small pale spots form a transverse row. Main part of body about as long as broad, pointed behind.

Legs short, fourth pair about as long as width of body, penultimate joints of all, except first pair, with a very long bristle, other joints with one or two short bristles and several at tip of tarsus, caroncles of hind legs smaller than of anterior legs.

Body with four long bristles each side; one in front, one (the longest) at humerus, one on posterior middle and one near tip; at each end of the anterior process is a bristle as long as the humeral one.

Length 5 mm.



Acrotocarus mirabilis n. gen. et sp.

From Cordoba, Mexico (Mann coll.). in bottle with Chrysomelids. Type in the author's collection.

Catocala luciana from Minneapolis (Lep.)

In the fall of 1913 I had the good fortune to take a number of specimens of *Catocala luciana* H. Edw. and its subform *somnus* Dodge. All the specimens were taken while at rest on the several bridges spanning Minnehaha Creek at Minneapolis. In 1914 but very few specimens were taken, as they appeared in very small numbers.

The species seem to be of a very local distribution here, being confined to an area bordering the creek of about half a mile long and about 200 feet wide. At least no specimens have been either seen or taken outside of this area as far as I know. The nearest locality from which the species has been reported is Nevada, Iowa (Berry). How the species happened to become established here along beautiful Minnehaha Creek is difficult to understand.—John W. Franzen, Minneapolis, Minn.

Duration of Pupal and Adult Stages of the Meal Worm, Tenebrio obscurus Linn. (Coleop.).

By PHIL RAU, St. Louis, Missouri.

About September 15, 1913, a lot of the yellow meal-worm larvae, *Tenebrio molitor* Linn., were found in a chicken-house in eastern Kansas. They were under a board among dry hen excrement and a multitude of their own shed skins. On May 10 and 15 two of them transformed into pupae. As no others pupated, I concluded the rubbish in which they were kept was too dry, so I moistened it slightly. This caused a growth of fungus which killed all the larvae.

In October of the same year I found in my own pigeon-house in St. Louis a lot of larvae of the dark meal-worm, *Tenebrio obscurus,* and made notes on the longevity of the adults and the length of time each spent in the pupal stage.

It is interesting to note that while the two lots were side by side in the laboratory, heated during the day in the winter, the dark meal-worms commenced to pupate at the end of February and the yellow ones, excepting the two mentioned heretofore, showed no signs of pupating up to the time of their death in June.*

At the end of May a search in the pigeon-house revealed a number of larvae and adults, commingled with shed skins and some dead adults. Several of the larvae were taken for controls. Here we have larvae which spent all of their lives in the open, in contrast with those fed in the laboratory. Eleven of these pupated in June and are added to the table, denoted by "s."

Table 1 gives the data of the duration of the pupal and adult life and the total for the dark meal-worm, *T. obscurus.*

It is interesting to note that all of these controls ("s" in table 1), lived shorter periods as adults and spent shorter periods as pupae. However, I do not consider that this necessarily indicates that the outdoor conditions of existence

*That these beetle adults appear considerably earlier than do the yellow ones confirms the observation of F. H. Chittenden in Bull. U. S. Dept. Agr. Div. Ent. N. S. No. 4, rev. ed., p. 118.

TABLE I.

Date of Pupation.	Duration of Pupal Stage.	Duration of Adult Stage.	Total Days.	Date of Pupation.	Duration of Pupal Stage.	Duration of Adult Stage.	Total Days.
2-28	14	31	45	3-28	20	38	58
2-28	19	31	50	3-28	20	36	56
2-28	21	37	58	3-29	21	34	55
2-28	15	43	58	3-30	23	23	46
2-28	21	50	71	3-30	24	?	?
3- 1	14	55	69	4- 1	21	20	41
3- 1	23	27	50	4- 2	21	28	49
3- 2	18	36	54	4- 6	18	23	41
3- 2	21	33	54	4- 7	17	13	30
3- 7	18	29	47	4- 7	17	27	44
3-10	17	31	48	4-12	14	27	41
3-11	18	?	?	4-24	13	21	34
3-14	16	28	44	5- 3	14	10	24
3-15	15	28	43	5- 3	14	11	25
3-17	16	?	?	5-12	11	16	27
3-19	22	?	?	5-15	11	11	22
3-20	17	27	44	5-31 s	5	12	17
3-20	17	27	44	6- 3 s	6	12	18
3-22	19	35	54	6- 6 s	7	11	18
3-23	18	15	33	6- 6 s	5	12	17
3-23	18	?	?	6- 6 s	7	12	19
3-24	17	35	52	6- 6 s	5	12	17
3-24	19	25	44	6- 6 s	5	12	17
3-24	19	25	44	6- 6 s	5	11	16
3-24	19	27	46	6- 6 s	5	12	17
3-25	20	13	33	6- 9 s	4	11	15
3-26	13	24	37	6-11 s	6	?	

are more favorable than the laboratory conditions, but rather that the prolongation of life results from inertia. We find in the cecropia moth* that colder condition is correlated with longer life, while warmer surroundings increase activity and cause earlier exhaustion. Here, too, we will find by glancing at the table that some of those which pupated in March enjoyed the longest combined period of pupal and adult life, and each succeeding month, as the weather grew warmer, brought a shorter duration until June brought the shortest life of all.

One might expect to find that the length of pupal life would in some way affect the adult life, either that a long pupal life would endow the individual with abundant vigor to carry it through a longer adulthood, or else that the combined length of life of pupa and adult was somehow allotted by nature and that when the pupal stage was extended the adult life would be correspondingly abbreviated, and *vice versa*, so the balance

*Journn. Exp. Zool., Vol. XII, p. 189, 1912.

would be maintained. But a scrutiny of these data reveals no evidence of such a result. In two cases the duration of the stages was equal, in six cases the pupal duration was greater than the adult duration, and in forty-one the adult life was the greater. In some cases we find a long pupal stage correlated with a long adult stage; in others we find a shorter pupal stage correlated with a still longer adult stage, etc., in almost every possible combination. The following tables show the details of the duration of the pupal stage, the adult stage and the combined durations.

TABLE 2.

Duration of Pupal Stage.

Days.	Frequency.
4 s	1
5 s	6
6 s	2
7 s	2
11	2
13	2
14	5
15	2
16	2
17	6
18	6
19	5
20	3
21	6
22	1
23	2
24	1

Av. 15 Ds.

TABLE 3.

Duration of Adult Stage.

Days.	Frequency.
10	1
11 s	5
12 s	7
13	2
15	1
16	1
20	1
21	1
23	2
24	1
25	2
27	6
28	3
29	1
31	3
33	1
34	1
35	2
36	2
37	1
38	1
43	1
50	1
55	1

Av. 24 Ds.

TABLE 4.

Combined Pupa & Adult.

Days.	Frequency.
15 s	1
16 s	1
17 s	5
18 s	2
19 s	1
22	1
24	1
25	1
27	1
30	1
33	2
34	1
37	1
41	3
43	1
44	6
45	1
46	2
47	1
48	1
49	1
50	2
52	1
54	3
55	1
56	1
58	3
69	1
71	1

Av. 39 Ds.

The duration of the pupal life of 54 individuals (see table 2) varied from 4 to 24 days, with an average of 15 days; 48 of these (table 3) passed through a normal adulthood of 10 to 55 days, with an average of 24 days, and the combined duration for these 48 individuals (table 4) gives a total life of 15 to 71 days, or 39 on an average. The tables are for both sexes; no attempt was made to distinguish the sexes.

Food. The food of both larvae and adults consists of feathers (the barbs), barley, oatmeal, sunflower seeds, seeds found in bird excrement, rice, dead crickets and dead larvae of their own species.

Exceptionally long duration of larval stage.—The species is generally annual in its development, but not without exception. The eggs are deposited in early summer; in August the larvae are full-grown, but go on feeding until about March, when they usually pupate, but some go on longer. In the material of *T. obscurus* taken full grown in October, 1913, I have three still feeding in the grown larval state now, November 16, 1914, and they seem to be healthy, and in good condition, while their sisters have done their share in propagating the race and died long ago.

Color. The color of the larva of *T. obscurus* is dark brown, while the entire pupa is cream white and remains so until about to transform into an adult; then first of all the legs and antennae assume a reddish brown color, then the head and finally the entire body. The adults at transformation are also of this brownish color, but gradually become darker until after a few days they are of a dull, piceous black color.

Three new Species of Japanese Orl Flies (Neur., Megal.).

By WARO NAKAHARA, Tokyo, Japan.

Amongst recent additions to my collection from different parts of Japan are the following three species of *Sialis* which are evidently undescribed. Although as ordinary-looking as the others, they possess anal appendages very different from those of any other known species.

Sialis diminuta n. sp. (Text-fig. 1).

Head black with about ten obscure brownish longitudinal streaks, of which the median two are very distinct, on caudal half; maxillary palpus ochraceous brown, excepting the basal joint which is black; labial palpus totally blackish; antennae black.

Prothorax evidently wider than the head, rounded on the anterior

angles and somewhat concave on the middle of the posterior margin; the rest of thorax totally blackish.

Legs all black, with fine hairs on coxae and femora; the first tarsal joint nearly as long as the second and third together in each leg; claws blackish.

Fore wing rather smoky, suffused with ferruginous in the basal portion and at pterostigma; veins stout and black, basal portion of the upper branch of media and the inner cross-vein between radial sector and media nearly colorless; about ten cross-veins in costal area; three or four veins in pterostigmatic region; one cross-vein between subcosta and radius. Hind wing much paler than the fore wing, especially so in anal area; pterostigmatic region darkish, containing two or three veinlets; some five or six cross-veins in costal area.

Abdomen dark piceous; the ninth segment moderately long; the tenth segment very short. Ventral appendages of the male long, narrow, and rounded at apex, wide apart from each other.

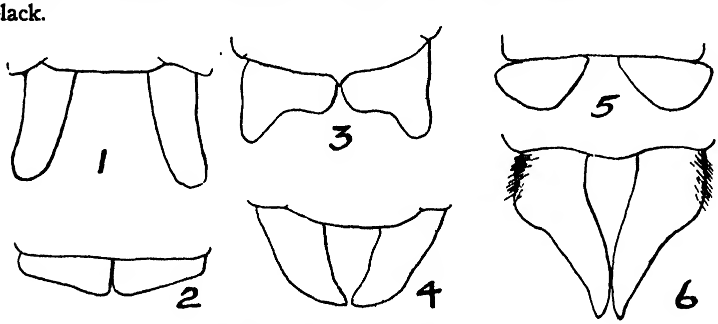
Length of body 8 mm., of fore wing 9 mm., of hind wing 7.5 mm.

A single male specimen, captured by me at Seta, near Tokyo, in April, 1914, is in my collection.

Sialis melania n. sp. (Text-fig. 2).

Head black with many impressed longitudinal lines on the caudal half; maxillary palpus black; labial palpus fuscous black; antenna black, shorter than fore wing.

Prothorax wider than broad, rather rounded on anterior angles, and somewhat concave on posterior margin; meso- and metathorax entirely black.



Ventral abdominal appendages of males of Japanese species of *Sialis*.
1.—*Sialis diminuta* n. sp. 2.—*S. melania* n. sp. 3.—*S. nikkoensis* n. sp.
4.—*S. japonica* v. d. Weele. 5.—*S. mitsuhashii* Okamoto. 6.—*S. frequens* Matsumura.

Legs deep black, the first tarsal joint shorter than the next two following joints together in fore and middle legs, but in hind leg these two parts are of nearly the same length.

Fore wing nearly black, somewhat paler in the discal area; basal

portion deeply blackish along subcosta, radius, media, lower cubitus and upper anal vein; membrane with a great many minute black spots. Venation black, excepting median fuscous portion of media; costal area blackish at basal half, gradually becoming paler toward middle, with about ten cross-veins; pterostigmatic region blackish, with one, two, or rarely three, fuscous veinlets. Hind wing paler, nearly colorless in anal area, but blackish in apical and hind marginal areas; pterostigmatic region tinged with fuscous. Venation mostly blackish, but radius, media and cubitus are yellowish at bases, and anal veins almost entirely yellowish; a blackish streak along the upper cubitus and first anal vein.

Abdomen black, somewhat brownish on ventral side. In the male, the ninth abdominal segment rather long, the tenth much shorter; ventral appendages are nearly equilaterally triangular in outline, and are very close together.

Length of body, 11 mm.; of fore wing, 11 mm.; of hind wing, 10 mm.

Two specimens (♂ ♀), captured by Mr. T. Esaki, at Minomo, near Osaka, in May, 1914, are in my collection.

Sialis nikkoensis n. sp. (Text-fig. 3).

Head blackish, a little narrower than prothorax, not narrowed posteriorly, beset with blackish hairs on the sides; caudal half of head with ferruginous streaks and spots; maxillary and labial palpi fuscous; antenna black.

Prothorax black, rather rounded on the anterior angles; meso- and metathorax nearly as large as prothorax, and totally blackish.

Legs black, coxae and femora of all the legs covered with short brownish hairs; the first tarsal joint as long as the next two following joints together in each leg; claws very small, piceous.

Fore wing slightly tinged with grayish; marginal area somewhat brownish; basal portion deeply variegated with piceous black, especially deeply along veins; pterostigma rather piceous. Venation black, basal portion of upper branch of media pale; 11-14 cross-veins in discal area; two very weak cross-veins in pterostigma; a single cross-vein between subcosta and radius. Hind wing slightly tinged with grayish throughout; pterostigma and apical area of the wing more or less suffused with brownish; venation mostly blackish or piceous; narrowly piceous along upper cubitus; 6-8 cross-veins in costal area.

Abdomen fuscous gray; the ninth ventral segment very short; the tenth segment short, yellowish and minutely spotted with piceous. Paired ventral appendages very large, nearly deltoid in shape when seen from below.

Length of body, ♂ 15, ♀ 17 mm.; of fore wing, ♂ 12, ♀ 14 mm.; of hind wing, ♂ 11, ♀ 13 mm.

Three male and seven female specimens, captured by me at Yumoto, Nikko, on July 29, 1914, are in my collection.

In studying these new species I had occasion to examine rather minutely the anal parts of all the Japanese forms of which I possessed adequate material, including all the described species excepting *S. jezoensis* Okamoto, of which only a single *female* specimen (type) is known. I have given here outlines of the ventral aspects of the appendages of the new species just described, together with those of other known species, as these are of considerable value in determination of the species.

Life History of Menesta albaciliella Chambers (Lep.).

By Annette F. Braun, Cincinnati, Ohio.

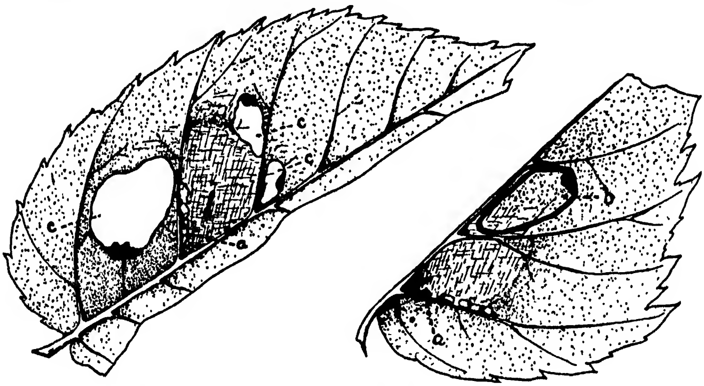
Strobisia albaciliaeella Cham., Can. Ent., X, 77, 1878;
Menesta albaciliaeella Busck, Proc. U. S. N. M., XXV, 903, 1903;
Dyar, List N. A. Lep., No. 5652, 1902.

The fact that the imagos of this species are always found in open woods or fields amongst patches of blackberries, and usually resting on the upper side of the leaves in the sun, pointed to the probability of blackberry for the food plant. A search for the larvae several weeks later resulted successfully and a number of moths were reared.

The larval habits of this species resemble in general those of the other two species of the genus, but show some interesting and peculiar variations from the habits of either.

On June 19, a number of larvae, some very young, others about half grown were secured on leaves of the common blackberry (*Rubus villosus* Ait.). The larva feeds on the under surface of the leaf, beneath a web of silk which begins in the angle between the midrib and a lateral vein and extends along the midrib and outwardly between two lateral veins. The accompanying figures will supplement the description to follow. At first the larva skeletonizes a narrow portion of leaf extending from the angle along a lateral vein, or rarely from the angle along the midrib itself (*a*). In the basal part

of this area, the upper epidermis is left intact, but there is no evidence that the larva is a miner at any stage. Farther out in the same area, holes are made but often a fragment of the upper epidermis is left. During this time the larva has been increasing the extent of its web, which however remains densest near its beginning, toward which it retreats when disturbed. Toward the outer edges of the web the larva then blocks out the area next to be consumed, thus: a narrow line leaving the upper epidermis intact is cut through the lower



Effects of feeding methods of the larva of *Menesta albaciliella*.
Explanation in the text.

epidermis and leaf substance, enclosing thereby an irregular oval or circular space (*b*). In the portion of this space first consumed, a small piece of upper epidermis is left, which soon becomes brownish and shriveled. In the rest of the oval space the entire substance is eaten (*c*). The earliest if such areas are usually small; there may be three or four similar holes, each larger than the preceding (*c*). The web is extended outwardly in a thin sheet to reach each of these spots (*c*). At maturity the web is thickened near the angle and drawn into an oval cocoon-like mass, within which the characteristic short and broad flattened pupa is formed. The imagos appeared July 11-18.

There is a second generation late in the summer which produces imagos the following spring.

On Some American Aeolothripidae (Thysanoptera).

By J. Douglas Hood, U. S. Biological Survey.

Three years ago, in this journal, Dr. E. A. Back recorded *Aeolothrips vespiformis* Crawford, as rather common at Orlando, Florida. The species had been described three years before from a unique female collected in Nicaragua. For it he erected the new genus *Franklinothrips*, in honor of Dr. Henry J. Franklin. A second species of this genus is described below, from Panama. The European *Aeolothrips albicinctus* Haliday is also reported for the first time from America.

FRANKLINOTHRIPS Back.

1912. *Franklinothrips* Back, Ent. News, Vol. XXIII, p. 75.

1913. *Franklinothrips* (pars), Bagnall, Trans. 2nd Intern. Ent. Congr., pp. 396, 397.

1913. *Franklinothrips* (pars), Bagnall, Journ. Econ. Biol., Vol. 8, p. 157.

Type. Aeolothrips vespiformis Crawford, designated by Back, l. c.

This genus is very distinct from *Aeolothrips*, in which its type species was originally described, as shown by the union of the head and prothorax into a compact elliptical mass; by the short broad head, whose outline as seen from above is almost exactly semi-circular; and by the narrow fore wings, which are without cross veins, distinctly broader across scale than at basal fourth, and which have a denuded area near base and long costal bristles.

Aeolothrips longiceps Crawford, *A. nasturtii* Jones, and *Mitothrips megalops* Trybom have recently been placed in *Franklinothrips;* but the first two of these appear rather to be true members of the genus *Aeolothrips* Haliday, while the third forms the type of the genus *Mitothrips* Trybom. *Aeolothrips longiceps* is almost certainly a male of *A. kuwanaii* Moulton in which the wing veins have become obliterated by the reagents used in its mounting; and it is just possible that this explanation is the proper one for the disappearance of the cross veins in the wing of *A. nasturtii*. Both species were described from uniques.

Mitothrips megalops certainly belongs in a distinct genus, for the third and fourth antennal segments are remarkably elongated, the fourth alone being nearly three times as long as the five succeeding segments combined. Furthermore, the head is greatly enlarged and not at all continuous in outline with the prothorax, and the eyes are exceedingly large, prominent, and reniform. It is doubtless the closest known relative of *Franklinothrips;* the resemblance of the wings is especially noteworthy.

As above restricted, *Franklinothrips* contains two species which may be separated by the following:

Key to the Species of Franklinothrips.

a. Antennae less slender, the third segment about 11 times as long as greatest subapical width; segments 1-3 clear pale yellow; combined lengths of segments 5-9 about 1.3 times as great as that of segment 3; 3 about 2.5 times as long as 5. Fore wing near apex with a rather poorly defined pale spot which does not attain the ring vein. (Fla., Tex., Nicaragua, Panama.)
F. vespiformis Crawford.

aa. Antennae more slender, the third segment about 13 times as long as greatest subapical width; segments 1-4 clear pale yellow; combined lengths of segments 5-9 about equal to that of segment 3; 3 about 3.7 times as long as 5. Fore wing near apex with a large distinct white area entirely occupying the space between the two portions of the ring vein. (Panama.)
F. tenuicornis Hood.

Franklinothrips vespiformis Crawford. (Fig. b).

1909. *Aeolothrips vespiformis* Crawford, Pomona Coll. Journ. Ent., Vol. 1, p. 109, fig. 49, A-D.

1912. *Franklinothrips vespiformis,* Back, Ent. News, Vol. XXIII, p. 75, figs. 1-3.

1913. *Franklinothrips vespiformis,* Hood, Psyche, Vol. XX, p. 119.

1913. *Franklinothrips vespiformis,* Bagnall, Trans. 2nd Ent. Cong., p. 397.

Distribution: Nicaragua (Crawford); Florida (Back); Texas (Hood); Canal Zone, Panama (Hood); Moro Island, Panama (Bay of Panama, near Taboga Island), October 17, 1913, 3 females, James Zetek.

Franklinothrips tenuicornis sp. nov. (Fig. a).

Female.—Length about 1.8 mm. General color blackish brown, with purple reflections, the head darkest; pterothorax with bright orange pigment; first abdominal segment orange, with a line of brown along sides and base; second and third segments clear white in apical two-thirds, brown at base; last segment lemon yellow; antennal segments 1-4 clear pale yellow, 5-9 dark blackish brown; fore femora orange, shaded with brown on outer surface; middle and hind femora white at extreme base, yellow at apex, the intermediate portion brown, with orange pigment; tibiae brown, tarsi yellow; wings of fore pair dark brown, with three transverse white bars; the first sub-basal, narrow, irregular, not traversing the scale; the second broad, crossing middle of wing; the third subapical, not quite attaining margins.

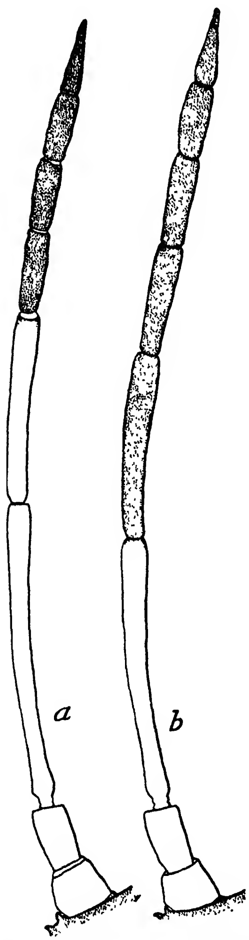


Fig. a, right antenna of *F. tenuicornis* Hood.
Fig. b, right antenna of *F. vespiformis* Crawford.

Head about two-thirds as long as wide, smooth and shining above, sloping evenly to base of antennae, the dorsal outline of cheeks, eyes and front of head almost exactly semicircular; frontal costa broadly rectangularly emarginate; a pair of rather prominent bristles between anterior and posterior ocelli, two pairs of smaller postocellar bristles, and a few still smaller bristles on cheeks and eyes; ventral surface of head flattened, densely hairy, produced anteriorly as far as the base of the first antennal segment, the apex of this production with a pair of dark bristles nearly equal in length to the two basal segments of antennae. Eyes longer than their distance from posterior margin of head, posteriorly prolonged on ventral surface, and with large, circular, separated facets. Ocelli of posterior pair twice the diameter of anterior ocellus and more widely separated. Antennae very slender, about 3.7 times as long as head; segment 3 about 13 times as long as greatest subapical width and 3.7 times as long as 5; combined lengths of 5-9 about equal to that of 3; segments 1-4 pale yellow, 4 grayish at apex; 5-9 nearly black. Maxillary palpi 3-segmented; labial palpi 4-segmented.

Prothorax slightly longer and broader than head, much broader than long, sides converging posteriorly, with a few minute bristles. Mesothorax semicircularly rounded in front. Wings of fore pair narrow, without cross veins, distinctly broader across scale than at basal fourth, and with a denuded area near base. Legs very long and slender.

Abdomen very narrow at attachment to thorax, subpetiolate, diverging to sixth segment, where it is about 1.3 times as wide as pterothorax, thence converging abruptly to tip. Bristles on segment 10 yellow, all others dark brown, arranged as in its congener.

Measurement of holotype: Length 1.76 mm.; head, length .198 mm., width .290 mm.; prothorax, length .222 mm., width .300 mm.; mesothorax, width .330 mm.; abdomen, width at segment 6, .432 mm. Antennal segments: 1, 36; 2, 48; 3, 246; 4, 156; 5, 72; 6, 60; 7, 54; 8, 43; 9, 16 microns; total length of antenna, .73 mm.; width at segment 3, .0195 mm.

Described from one female taken by Mr. James Zetek, by sweeping, Moro Island, Panama (Bay of Panama, near Taboga Island), October 17, 1913.

Closely allied to *F. vespiformis*, with which it was taken and at first confused, but easily distinguished by the characters given in the key.

Aeolothrips albicinctus Haliday.

1836. *Aeolothrips albicincta* Haliday, Ent. Mag., p. 451.

1838. *Aeolothrips albicincta*, Burmeister, Handb. d. Ent., Bd. II, p. 418.

1843. *Aeolothrips albocincta*, Amyot et Serville, Ins. Hemip., p. 646.

1852. *Aeolothrips albicincta*, Haliday, Walker, Homop. Ins. Brit. Mus., p. 1118.

1879. *Aeolothrips albicincta*, Reuter, Diagn. öfv. nya Thys. f. Finland, p. 7.

1895. *Aeolothrips albocincta*, Uzel, Monogr. Ordn. Thys., p. 75, Tab. I, Fig. 3.

1899. *Aeolothrips albicincta*, Reuter, Acta Soc. Fauna Flora Fennica, Vol. XVII, No. 2, p. 33.

1907. *Aeolothrips albocincta*, Buffa, Atti Soc. Tosc. Sci. Nat., Mem., Vol. XXIII, p. 57.

1907. *Aeolothrips albocincta*, Buffa, Processi verbali d. Soc. Tosc. Sci. Nat., adunanza del dí 7 luglio, 1907.

1908. *Aeolothrips albocinctus*, Buffa, Redia, Vol. V, p. 134.

1913. *Aeolothrips albocinctus*, Williams, Journ. Econ. Biol., Vol. 8, p. 216.

1914. *Aeolothrips albicinctus,* Karny, Verh. k. k. zool.-bot. Gesellsch. Wien, LXIV Bd., p. 51.

Five females (of which two are macropterous) and one male (brachypterous) were taken in the State of New York by Mr. J. C. Faure, when he was a student in Cornell University. They were correctly identified by Mr. Faure, and have subsequently been compared by the writer with authentic European material. The detailed records of the specimens are as follows: Canastota, New York, July 29, 1912, 3 ♀♀, of which one is macropterous, on corn leaves; Canastota, N. Y., Aug. 1912, 1 ♂, brachypterous, reared; Chester, N. Y., Aug. 14, 1912, 1 ♀, brachypterous, on onion; Elmira, N. Y., July 1, 1912, 1 ♀, macropterous, on onion.

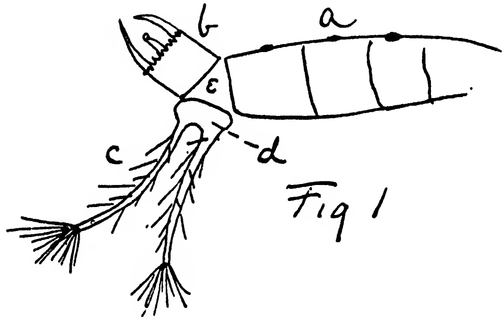
An interesting addition to the American list, which in Europe has been recorded from England, Finland, Sweden, Austria, Italy, Portugal and Sardinia.

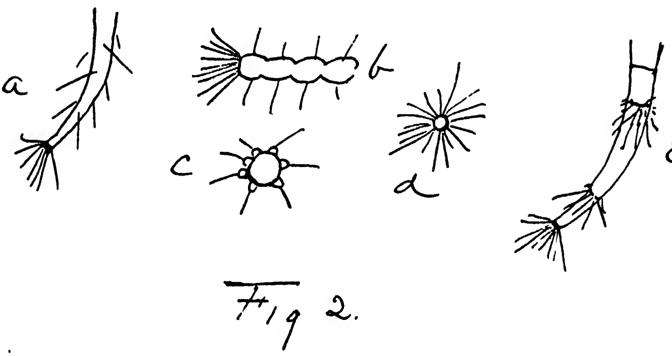
A Remarkable Abdominal Structure in Certain Moths (Lep.).

By FREDERICK W. RUSSELL, M. D., Dallas, Texas.

Many years ago while living and collecting at Winchendon in the northern part of Massachusetts, I was one day manipulating the abdomen of a certain moth for the purpose of expressing the eggs. Suddenly there shot out from the extremity of the abdomen a tubular process, curved, tapering and crowned at the end with a neat little brush of yellowish hair. It was of a pale flesh color and sparingly clothed with delicate, long, brownish hair. With the slightest variation in the pressure, or by the motion of the air, it waved to and fro in a very interesting way. I tried by maintaining the pressure for a long time to get it to harden and so be preserved as a specimen, but after a half hour's effort I desisted, when it suddenly shot back out of sight. I have always believed that the species was *Drasteria erechtea,* but I have not been able to see it in that species since, and the observation remained unique until very recently.

Driven to the South by failure of health, I have taken up my residence in Dallas, Texas. Here the nights of March 31st and April 1st, of 1913, were very dark, very warm and sultry. In the evening there was a huge halo of insects gyrating around an arc light near my house. The ground beneath was black with beetles, *Calosoma scrutator* in great numbers, *Carabus lugubris*. big black water beetles and two large species of Dytiscidae, with Lachnosternas by the handful. Now and then plump white moths whacked down on the roadway, and proved to be the well-known moth of the salt marsh caterpillar of Harris—*Estigmene acraea*, Drury—often excessively abundant in the middle states. I secured a great many specimens and made a beautiful plate of nature-prints illustrating the wide variation of the species in size and the number and proportions of the black dots. Applying my thumb and forefinger of the left hand to the sides of the abdomen of a male, I moved them slowly and firmly down toward the anal portion of the abdomen, when to my great surprise and delight, the long-sought abdominal process shot out of the last segmental line on the ventral side and waved back and forth as of old. In one specimen the anal segment lifted itself upward strongly and gave so fine a view of the affair that I seized my pencil and got a fairly good drawing of the structure, though I have no facility in that work and certainly no felicity. I have reproduced this sketch as text fig. 1, accompanying this article. As the pressure increases near the end of the body, the anal segment lifts itself upward more or less and the last suture begins to widen. To the right and left laterally, first appear in the widening aperture, the tips of two brushes of hair, when suddenly, always amusingly suddenly, there shoot out two flesh-colored, curved, tapering, tubular processes, united at the base, and with a brush of hair at the ends. The sides of the tubes are somewhat crenulated, as if segmented, although that does not seem to be really the truth, and there is a rather scanty growth of delicate, brownish hair along and around the tubes. Their constant waving gives the impression that they are alive. I verified this observation in the fall of 1913 and in April and





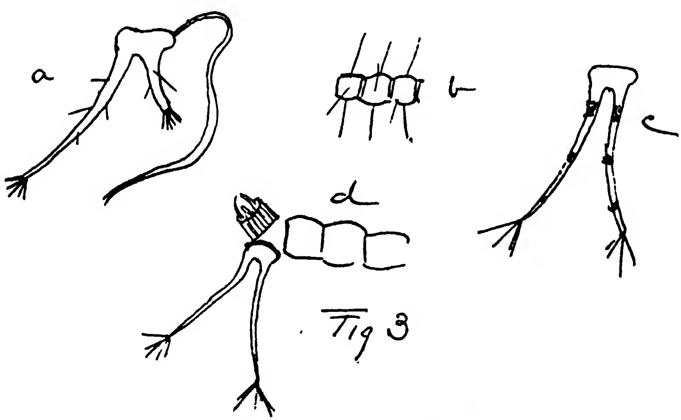


Fig. 1.—*Estigmene acraea* ♂; *a* abdomen, right side; *b* anal segment strongly thrown upwards; *c* tubular processes projecting from anal suture; *d* basal union of the two tubes; *e* anal suture widely opened.

" 2.—*Ctenucha venosa*; *a* curved tube; *b* edge of tube; *c* cross-section of tube; *d* circular brush at end of tube; *e* circular brushes of hair and basal thickening.

" 3.—*Scepsis fulvicollis*; *a* process extracted with thread-like attachment; *b* feeble crenulations of tube; *c* golden bands of color found occasionally around the tube; *d* the processes expressed.

September of 1914, although the species has been rare since the great flight of the spring of 1913.

In the fall of 1913 and again in May and October, 1914, there were abundant examples of the pretty moth *Ctenucha venosa,* with very black wings, with reddish stripes lengthwise of the fore wings and the edges of the shoulder-lappets also tinged with red. In the spring they were flying about the blossoms of the horsemint, near a wood of hackberry trees. In October they were resting on and flying about the yellow-blossomed broom weed which covers the fields with vast sheets of bloom. In the *venosa* I also found this strange process in the males. It seems a little stouter in proportion to the size of the insect. In May many of the examples were defective, poorly developed. Normally they are about 5/8 of an inch long, with the sides a little more crenulated, the crenulations extending around the tube, and dotted with the usual delicate hairs. In one case there was a circular fringe of hair at the base, another midway and the usual brush at the end. Sometimes there was a band of golden yellow about the base and one or two more along the tube. The brush at the end was also circular.

In the fall of 1913 I secured one male of *Scepsis fulvicollis* which had precisely the same structure, and on October 23, 1914, I got two males and one female, and during the next two weeks they were not rare. Always the males possessed this process, never the females, which makes me feel that the first Winchendon example was also a male. In *fulvicollis* the process is much longer and more delicate than in *Estigmene acraea* and in *Ctenucha venosa.* It measured in one case 1 1-16 inches. The sides of the tubes are hardly crenulated, and the terminal brush very small. In one case there was a thickening at the base, of a slightly different hue, and in this case also a circular brush of hair near the end. On one occasion I cut off the anal segment and extracted the process. Attached to the basal cross-bar was a thread-like tubular structure two inches long, which I thought might be an intestine and probably not a real factor in the case.

On November 22, 1914, a boy friend brought in a fine

fresh male of *Ctenucha cressonana*. "It is, it is, The Cat!!" It presents a fine example of the process, long, quite slender, smooth, with denser but shorter hairs along the tubes and a smaller brush at the ends.

It is not to be supposed that I have secured all the species of moths that have this peculiar structure. Yet for many years I have very regularly tested almost everything that has come in my way. I have found, however, some peculiar features in two or three butterflies. I have examined very few Geometrids. Of the four species certainly known, one is a Bombycid, and three are Syntomids, a family that contains an immense number of species in the lands to the southward.

It is to be hoped that some one familiar with histological work can investigate further. Very fresh specimens will be needed.

The sketches made to illustrate the text are diagramatic.

A new Nearctic Gonomyia (Tipulidae, Diptera).

By CHARLES P. ALEXANDER, Ithaca, N. Y.*

The crane-fly herein described as new appears to be rather widely distributed in northeastern North America, but has been confused with previously described forms.

Gonomyia (Gonomyia) mathesoni sp. n.

Color light brown, the thorax rather indistinctly striped; femora without brown bands; wings nearly hyaline; *Sc* long, extending far beyond the origin of *Rs;* cell *1st M2* open by the atrophy of the outer deflection of vein *M3*; basal deflection of *Cu1* far before the fork of *M*.

Male.—Length, 5-5.2 mm.; wing, 6-6.1 mm. Female.—Length, 6.6-6.8 mm.; wing, 6.3-7 mm.

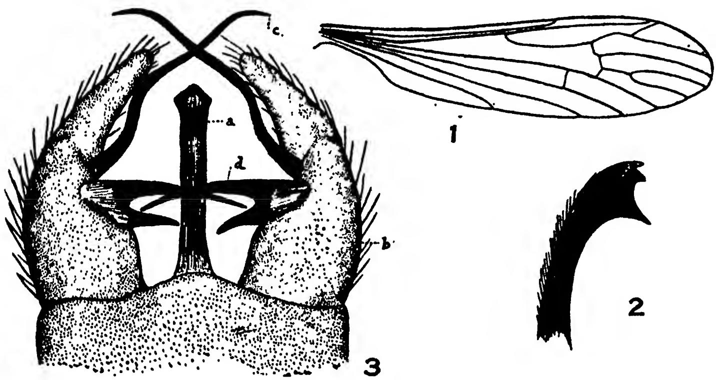
Rostrum and palpi dark brownish black. Antennae rather short, the three basal segments light yellow, the remaining segments brownish. Front white, the vertex more yellowish, the region adjoining the eyes behind more brownish.

Pronotum pale, whitish. Mesonotal praescutum light yellowish brown with indistinct darker brown stripes behind, one on either side of the rather broad median area, these extending from the transverse suture to the proximal ends of the pseudosutural foveae; lateral mar-

*Contribution from the Entomological Laboratory of Cornell University.

gins of the sclerite broadly white; in alcoholic specimens four stripes show on the praescutum, the elongated median one being subdivided by a narrow line; scutum light yellowish brown with a large rounded brown spot on each lobe; scutellum and postnotum reddish brown. Pleura pale brown and white, the brown being in the shape of a broad band extending from the cervical sclerites to the postnotum; sternites brown. Halteres rather long, pale yellowish brown.

Legs with the coxae and trochanters light yellow, remainder of the legs light yellowish brown, the tarsi a little more infuscated.



Gonomyia (*Gonomyia*) *mathesoni* n. sp.
Fig. 1.—Wing. Fig. 2.—Hypopygium, lateral aspect of the penis guard.
Fig. 3.—Hypopygium, ventral aspect. *a* penis guard; *b* pleura; *c* dorsal apical appendage; *d* ventral apical appendage.

Wings hyaline or nearly so, stigma barely indicated, veins pale yellowish brown. Venation: (see text figure 1) *Sc* long, extending to about midlength of *Rs*; *Rs* elongated, arcuated; *R2* + 3 subangulated at the proximal end of the stigma; basal deflection of *R4* + 5 usually angulated; cell 1*st M2* open by the atrophy of the outer deflection of vein *M3*; basal deflection of *Cu1* far before the fork of *M*, this distance being longer than the deflection.

Abdominal tergites brown, narrowly and indistinctly margined on the lateral and caudal edges with dull yellow; sternites dull yellow. Male hypopygium (see text figure 3) with the ninth pleurite (*b*) enlarged at the base, at the apex produced caudad into an elongate, fleshy lobe, pale in color and provided with numerous hairs; the ventral inner face of the pleurite is provided with two appendages, the dorsal one (*c*) very long, slender, simple, twisted, pale and blackened at the tip; the ventral appendage (*d*) is bifid, the outer arm over twice as long as the short cephalic inner arm; in a position of rest both of these appendages are decussate. Penis-guard (*a*) viewed from the side (see text figure 2) elongate, bent slightly ventrad, the tip enlarged and provided on the lower surface with four teeth, the

lower pair of which are the larger. Gonapophyses small, pale, feebly chitinized, cylindrical, on the cephalic face at two-thirds the length with a feeble chitinized tooth.

Habitat.—Eastern United States and Canada.

Holotype, ♂, Sacandaga River, Fulton Co., N. Y., June 26, 1914 (Alexander).

Allotype, ♀, topotypic.

Paratypes, 30 ♂, ♀, topotypic. 10 ♂, ♀, Truro, Nova Scotia, July 7 to 26, 1913 (Matheson).

This interesting species has long been confused with *Gonomyia cognatella* O. S., but has little in common with that insect. It is more closely related to *G. blanda* O. S., but is easily separated by the unmarked wings. The cell *1st* M^2 open by the atrophy of the outer deflection of vein M^3 is found only in *cognatella, blanda* and *mathesoni* in Eastern North America. These three species may be separated as follows:

1. Basal deflection of *Cu1* at the fork of *M; Sc* short ending just before the origin of *Rs.* — *cognatella* O. S. *.

Basal deflection of *Cu1* far before the fork of *M; Sc* long, ending beyond the origin of *Rs.* — 2.

2. Wings spotted. — *blanda* O. S. †.

Wings unmarked. — *mathesoni* sp. n.

This species is named in honor of the collector of the paratypes from Nova Scotia, Dr. Robert Matheson, of Cornell University.

The insect, both in New York and in Nova Scotia, is found on rich vegetation along the banks of rivers. The Tipulidae found in association with this species include the following: *Antocha saxicola* O. S., *Cryptolabis paradoxa* O. S., *Rhabdomastix* (*Sacandaga*) *flava* Alex., *Gonomyia sulphurella* O. S., etc.

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* *cognatella* Osten Sacken; Proc. Acad. Nat. Sci., Phila., 1859, 230; Monographs of the Diptera of North America, IV, 1869, 181, pl. IV, fig. 18 (male genitalia); 23rd Report N. Y. State Entomologist, 1907, Needham, Crane-flies of New York, pl. 24, fig. 4 (wing).

† *blanda* Osten Sacken; Proc. Acad. Nat. Sci. Phila., 1859, 231; Monographs of the Diptera of North America, IV, 1869, 182, 183, pl. IV, fig. 17 (male genitalia); 23rd Report N. Y. State Entomologist, 1907, Needham, Crane-flies of New York, pl. 24, fig. 5 (wing).

Three Synchloes, Their Differences and Relations (Lep.).

By Victor Duran and Fordyce Grinnell, Jr.,
Los Angeles, Calif.

A casual examination of a series of *Synchloe lacinia* form *saundersii* from Argentina so impressed the authors by the similarity of this form to our *californica* (Wright) that we decided to make a somewhat detailed comparison of these two forms and also of *lacinia* (Hübn.).

We are indebted to Mr. J. R. Haskin for the loan of a series of *californica* and *lacinia*, and to Dr. E. Giacomelli for a series of *saundersii* from Argentina. Mr. Wright's "Butterflies of the West Coast" and Dr. G. B. Longstaff's "Butterfly Hunting in Many Lands" furnished us with information as to habitat, and other data. In the Entomological News, Volume 25, page 303, Mr. Haskin gives a description and account of *californica*.

Upper side, primaries: The marginal buff spots in *californica* are larger and more distinct than in *saundersii;* in *lacinia* they are white and less distinct. In all, the fifth, sixth and seventh spots are always present and most distinct.

The buff median band in *californica* and *saundersii* is even in width across the wing; in *lacinia* it is narrower at the anterior part.

The fifth spot of the band in *californica* is generally small, in *lacinia* it is smaller, but in *saundersii* this spot is large and elongated outwardly to envelop the white spot of the submarginal row, and sometimes extends to the buff spot of the marginal row.

The three basal spots are very much larger in *saundersii* than in either of the others.

Secondaries: The marginal buff spots in *californica* are always large, in *saundersii* they are, in some, large and distinct and, in others, small and indistinct; in *lacinia* they are always very faint.

The buff median band in *californica* is similar to that of *lacinia;* in *saundersii* it generally extends to the basal angle, but sometimes it is stopped by a narrow black band, one-third the distance from base to margin.

In *californica* the basal area is brownish-black with one small buff. spot in the cell; in *lacinia* there are two spots in the cell while in *saundersii* the spot is so large as to take the place of the brownish-black area almost entirely.

Under side, primaries: The marginal buff spots in *californica* and *lacinia* are always distinct; in *saundersii* they are small and faint.

In *californica* the white spots of the submarginal row are generally small; in *lacinia* they are twice the size and in *saundersii* they are of intermediate size.

The yellow median band is even in width across the wing in *californica* and *saundersii;* while in *lacinia* it tapers off toward the anterior part.

In *californica* the base is brownish-black, except the inner half of cell which is buff and a white spot in outer half of cell; in *lacinia* and *saundersii* this area is brownish-black with two buff spots in the cell and one between veins Cu2 and A.

Secondaries: On the outer edge of the yellow median band in *lacinia* and *saundersii* there are some spots partly detached by black marks, but in *californica* there are no such spots. The number and position of these spots vary greatly.

The base is brownish-black; in *lacinia* there is a row of four buff spots, and beyond this there is one spot in the cell and one between veins SC and R; in *saundersii* and *californica* there is no such spot between veins SC and R.

Habitats. californica: Goldroad, Ariz. (1), Colorado Desert (4);

lacinia: Georgetown, Texas (1), Southern Arizona (4);

saundersii: Caracas, Venezuela (2), San Juan, Trinidad (2), La Rioja, Argentina (3).*

References: (1) Mr. J. R. Haskin, (2) "Butterfly Hunting in Many Lands" by Dr. G. B. Longstaff, (3) series from Dr. E. Giacomelli, (4) "Butterflies of the West Coast" by W. G. Wright.

To our minds these three names represent geographical forms of one species found from Argentina to California. It is seen by our comparison that *saundersii* is closer to *californica* than it is to *lacinia*. To show our ideas more graphically we would suggest the arrangement of these forms as follows:

Synchloe lacinia lacinia Hübn.

Synchloe lacinia saundersii Doub.-Hew.

Synchloe lacinia californica Wright.

*According to the catalogues of Dyar and Strecker and an article in *Papilio* by Aaron, *saundersii* is found in the United States and the habitat is given by Aaron as Texas.

Three new Species of Coleoptera from North Carolina.

By A. H. MANEE, Southern Pines, North Carolina.

The following species of beetles were declared to be new by the late Frederick Blanchard after whom I have named the first. Types have been placed in the collection of the Academy of Natural Sciences of Philadelphia.

Selenophorus blanchardi n. sp.

Color dark brown with wings slightly metallic, scarcely lighter beneath, antennae light, paler towards base.

Head moderate with two long and four shorter bristles in front; eyes prominent with long bristle at base; antennae not reaching to base of thorax, a bristle at front of first segment.

Thorax as wide in front as at base, sides from rounded frontal corner rounding almost evenly to very near basic angle, edge with bristle at anterior two-fifths, median stria almost or quite obsolete, without punctures, basic depressions almost or quite obsolete but slightly rugose, edge depressed quite evenly except more widely near base.

Elytra from rounded shoulders very gradually widening to middle, thence rounding in and at apical sixth more abruptly with marginal depression at apical eighth, striae distinct but shallow with intervals smooth and flat, second inner stria with four punctures at regular intervals of .5 mm. and with a fifth puncture only .25 mm. from the fourth.

Legs: all tibiae strongly bristled, hind tibia longer than tarsus, first segment of hind tarsus as long as the remainder.

Length 5 mm., width 2.3 mm., length of elytra 3 mm.

From four specimens taken by the author at Southern Pines, North Carolina, about mid-April of 1912, 1913 and 1914.

Erchomus politus n. sp.

Color piceous. The microscopic uni-pilose punctures so widely separated by such smooth spaces as to allow the appearance of a polished surface, even the microscopically crinkled head. also shining, midwings, edges, legs, antennae and mouth parts lighter.

Head not large, eyes with minute facets in relief; antennae very pilose, segments 3 to 10 gradually increasing, the eleventh diminishing to tip and as long as 9 and 10 combined, extending to basic third of thorax.

Thorax at sides with sutural edge rounding out to near base, thence parallel and as wide as elytra, at basic edge a slight spur conforms to rounded shoulder of elytra, from which the base runs very evenly in a semi-cylindrical arch scarcely flattened at top.

Elytra conforming to thoracic base, sides parallel, the tip practically parallel with frontal edge.

Abdominal segmental edges pilose, the last more strongly so or bristled, four segments protruding beyond elytra or sometimes drawn in telescopically, giving the appearance of being dropped or broken off.

Length 2 mm., width 1.2 mm., length to tip of elytra 1.6 mm.

Specimens abundant under bark of dead pines and deciduous trees and when exposed very lively to avoid the light.

Coenocara nigricornis n. sp.

♂. Antennae and palpi dark or fuscous, a peculiarity seen in no other species except the very unlike *scymnoides* Lec. Color piceous, not as dark as in *oculata,* which this species most closely resembles, the more profuse pilosity giving it a gray-brown aspect; finely and densely punctulated throughout, the punctures more widely separated than in *oculata;* head proportionately larger, but eyes as small and about equal in both sexes cleft about two-thirds (in *bicolor* Germ. the eyes are nearly black, the facets more in relief, the cleft only to middle and in the ♂ much larger than in the ♀). The elytral striae, two complete near margin and one short frontal just above, are as in *oculata.*

Length 2.6 mm., *oculata* and *bicolor* being about 2 mm.

Five specimens in all, three in possession of author and one ♂ one ♀ in the Blanchard addition of the LeConte collection at Cambridge, Mass.

The North American Species of Draeculacephala (Homoptera).

By E. P. Van Duzee, Berkeley, Calif.

A fine series of these insects from Georgia and Florida received from Prof. J. C. Bradley has enabled me to make out with some degree of certainty all the known forms except *producta* Walker, and to distinguish four still undescribed. In the following key the characters have been taken mostly from the females as they are usually more abundant

and show better diagnostic characters. In the males the vertex is uniformly shorter with the dark markings more pronounced.

KEY TO THE SPECIES:

Line of the face when viewed from the side rectilinear or nearly so 1

Line of the face strongly arcuated, the front tumidly convex......12

1, Markings of vertex consisting of pale brown mottlings, arranged more or less distinctly in longitudinal series; color dull testaceous yellow, the broad anterior margin of pronotum and elytral venation whitish; vertex acute, nearly as long as broad; last ventral segment of female distinctly bisinuate; length 8-9 mm.; Florida ....*floridana* Ball.

Vertex not mottled; markings in lines and points more or less distinct 2

2, Five black points on the vertex (including the ocelli) and two on the base of the scutellum 3

Vertex and scutellum without distinct black points or the ocelli only marked with black 4

3, Color pale testaceous tinged with brownish, the costa only yellowish; anterior margin of pronotum with vermiculate marks including a distinct black spot behind the eye; vertex acute, as long as broad; last ventral segment of female produced, the lateral angles right-angled; length 6 mm.; Southern states, *7-guttata* Walk.

Color typical of the genus, yellow with the disk of the pronotum and the elytra green; anterior black point on the vertex often obsolete in the male, the lines obscure; vermiculate marks on the anterior margin of the pronotum faint or wanting, not forming a point behind the eye; vertex acute, not as long on the middle line as wide at base including the eyes; last ventral segment of the female scarcely bisinuate, the lateral angles sometimes moderately produced; length 6 mm.; Georgia..*balli* n. sp.

4, Vertex acute, much less than right-angled in the female; pronotum with a group of black punctures before the humeri 5

Vertex obtuse, scarcely more than right-angled before; pronotum without a group of black punctures before the humeri 9

5, Vertex greatly produced, at least as long as broad across the eyes; lines on vertex indistinct; green and yellow of the upper surface clear, elytral nervures bluish; beneath testaceous; female without fuscous vitta on the sides, its last ventral segment truncated and but little produced; length 9 mm.; Florida.*acuta* Walk.

Vertex not as long as wide across the eyes.................... 6

6, Anterior margin of pronotum with vermiculate dark marks; lines on the vertex obviously interrupted or dotted; hind edge of vertex with a short oblique brown line behind each ocellus; beneath black or fuscous; face black in both sexes; last ventral segment of female nearly truncated, slightly produced at the middle; length 6 mm.; Georgia ....*bradleyi* n. sp.

Anterior margin of pronotum without vermiculate marks; oblique line wanting on hind margin of the vertex 7

7, Vertex equal in length to the pronotum; male black beneath; last ventral segment of female obviously bisinuated, the median tooth longer than the lateral angles; length 6 mm.; United States, *minor* Walk.

Vertex one-half longer than the pronotum; males rarely deep black beneath, at least on the face 8

8, Larger; markings on vertex more obsolete, often scarcely indicated; elytral venation pale, the pronotum without pale longitudinal lines; last ventral segment of the female more produced, the lateral angles obvious; length 9-10 mm.; U. S. and Canada to Rocky Mts. ....*angulifera* Walk.

Smaller, markings on vertex distinct; elytral venation more or less bluish; pronotum with three bluish longitudinal lines; last ventral segment of the female more truncated; length 7 mm.; United States ....*mollipes* Say.

9, Anterior margin of pronotum with vermiculate dark marks; vertex subacute before; scutellum with three points and a line black; colors dull; last ventral segment of the female truncated, a little roundedly produced at the middle; length 7 mm.; Georgia, *inscripta* n. sp.

Anterior margin of pronotum without vermiculate marks........10

10, Male: head subacute, angle of the vertex distinctly less than a right-angle; markings of vertex heavy, including a sagittate mark before the apex and an annulus next the eye; form narrower; plates produced in long acute upturned points; length 7 mm.; Colorado to Canada ....*manitobiana* Ball.

Head more obtuse, apex of the vertex about a right-angle in the male, scarcely less in the female; markings of vertex lighter, with an incomplete annulus next the eye and no sagittate mark before the apex; form broader 11

11, Black marks at apex of the vertex narrower, linear and parallel in the female, broader and more diffuse in the male but not transverse or divergent behind; sides of the pronotum without a black line behind the eye; male antennæ long, thickened to near its tip; male plates with abrupt, slender and divergent tips; length 7-8 mm.; Washington and Oregon ....*crassicornis* n. sp.

Black marks at apex of vertex broad and subtriangular, transverse behind; sides of the pronotum with a slender black line behind the eye; male antennae normal, setaceous; plates of male with slender divergent tips; length 8 mm.; United States and Canada ....*noveboracensis* Fitch.

12, Vertex about as long as the pronotum; whitish with a short median line at base and a broad wedge-shaped vitta at apex, the latter mottled; scutellum with a transverse line and sometimes four points black; Colorado ....*gilletti* Ball.

Vertex much shorter than the pronotum, fulvous with a polished black dot on each ocellus; scutellum immaculate or with the incised line slenderly brown, South States to California..*reticulata* Sign.

DESCRIPTIONS OF NEW SPECIES:

Draeculacephala balli n. sp.

Allied to *7-guttata* Walker but differs in being smaller, green instead of testaceous brown, and in wanting the black points on the pronotum behind the eyes and the anterior point on the vertex is often wanting. Length 5-6 mm.

Vertex in the male as long as the pronotum, distinctly longer in the female; sides viewed from above rectilinear, not slightly concave as in *7-guttata*. Front viewed from the side nearly rectilinear, not obviously concave as in the female *7-guttata*. Last ventral segment of female moderately produced, the lateral angles sometimes a little prominent; male plates longer than the pygofers, acute and a little produced and recurved at apex, about as in *7-guttata*.

Color green, somewhat obscure; vertex, costa and anterior margin of pronotum obscure greenish or whitish yellow. Three points on the vertex and an angular mark at the apex black; the two posterior points are more conspicuous and are placed on the hind margin behind the ocelli. Pale anterior margin of the pronotum sometimes with faint green mottlings. Scutellum with two conspicuous black points within the basal angles. Beneath and legs pale brownish testaceous; front darker with a black point at apex and another in the antennal cavity, and about seven darker arcs; sides with a blackish vitta under the eye extended over the pleuræ, sometimes diffuse; tergum blackish, darker in the male.

Described from numerous examples of both sexes taken on Billy's Island in the Okefenokee Swamp, Georgia, in June, and in Decatur County, Georgia, in July, by Prof. J. C. Bradley. This is evidently the form described by Dr. Ball as *7-guttata* in his Review of the Tettigonidæ. His specimens were from Florida and Mississippi.

Draeculacephala bradleyi n. sp.

Allied to *balli* but averaging smaller. Length 5-6 mm.

Vertex long; of the female one-fourth longer than the pronotum, of the male scarcely longer; sides rectilinear. Front viewed from the side very feebly concavely arcuated. Clypeus quite strongly angled. Last ventral segment of female short-triangular at apex, the sides nearly straight; plates of the male longer than the pygofers, acute but not produced at apex.

Color a rather dull dark green, nervures paler; vertex, broad anterior margin of pronotum, scutellum and costa yellow, more or less tinged with green. Lineations of the vertex obscure, especially in the female; hind margin with a short oblique line behind each ocellus; ocelli black; extreme tip of vertex fulvous with a minute brown dash on either side. Pale anterior margin of pronotum with dusky lines and points, more conspicuous in the male. Beneath nearly black, deeper on the face, where the frontal arcs are often obsolete; edge of the head clear yellow. Venter sometimes greenish, the edge of the connexivum pale.

Described from one female and many males taken on Billy's Island, Okefenokee Swamp, Georgia, in June, and in Decatur County, Georgia, in July, by Prof. J. C. Bradley, to whom this species is dedicated in recognition of his able assistance in the collection and study of the Hemiptera. I have tried to identify this species with *producta* Walker, but I find too many discrepancies to allow of such determination.

Draeculacephala inscripta n. sp.

Allied most closely to *minor,* but more stoutly built, with the vertex and anterior margin of the pronotum heavily lined with black. Length 7 mm.

Vertex acute at apex, a little shorter than the pronotum, its length nearly one-half its width across the eyes; the surface behind the apex not so strongly depressed as in some of the allied forms; clypeus unusually tumid and strongly angled when viewed from the side. Last ventral segment of the female roundedly produced at the middle, this lobe shorter and less angled than in the allied species.

Color dark dull green above with the vertex, anterior margin of the pronotum, scutellum and costa dull yellowish. Markings of the vertex heavier than in any allied species, more typical of the *noveboracensis* group; these marks consist of four arcs on the reflexed base of the front, which unite to form an oblique black ray either side of the apex;

a curved line behind these which is angled where it touches the apical margin before the ocellus and is continued to the eye as a marginal line, a more strongly curved line on the disk behind this terminating behind the ocellus and near a vertical line which with the marginal line and one next the eye nearly encircles a black dot; median line slender, black. Pale anterior margin of the pronotum with vermiculate dark marks. Scutellum with the anterior margin, in part beneath the pronotum, the transverse incised line and three points before it black. Elytral venation pale. Beneath pale, face darker, with about 10 brown arcs. A lateral line cutting the eye deep black; apex of the head black bisected by a yellow line.

Described from a single female taken in the Okefenokee Swamp, Georgia, in June, by Prof. J. C. Bradley.

Draeculacephala crassicornis n. sp.

Allied to *noveboracensis,* but with the vertex a little longer in the female and more heavily lineated with black; male antennae stout, setaceous only at tip. Length 7-8 mm.

Vertex about right-angled in the male, a little longer in the female. Lineations of the vertex slender but distinct; black marks at apex of the vertex parallel, not at all triangular in the male, in the female linear, in both sexes leaving a conspicuous yellow median vitta. Plates of the male abruptly narrowed to long, slender points as in *manitobiana,* but here they are strongly divergent, almost at a right angle, not upturned as in the other species. Antennae of the male long and conspicuously thickened nearly to the apex and a little flattened, the middle of the thicker portion a little more slender. Last ventral segment of the female less produced than in *noveboracensis,* with the lateral angles more retreating.

Colors duller than in *noveboracensis,* the apex of the pronotum and base of the vertex sometimes touched with green; sides of pronotum without a black longitudinal line. Elytral venation more or less bluish. Antennæ testaceous, becoming black on the apical one-half of the thickened portion, with its apical seta white.

Described from two males and one female collected at Rock Creek, Oregon, July 14th, and two females from Corvallis, Oregon, all received from Dr. H. F. Wilson, and one female in my own collection taken by Mr. T. Kincaid at Olympia, Washington. Should these sexes be incorrectly placed the name must follow the male. The unusually thickened antennæ of the male will distinguish the species.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., APRIL, 1915.

The Intensive Study of Species.

The differentiation of species or of larger taxonomic groups on the basis of the differences shown by a single structural feature, a single organ or a single system of organs, is a familiar feature in the history of biological classification. As a student of the late Prof. E. D. Cope, we recall a remark made by him to the effect that eventually each group would probably be defined by a single character only. At nearly the same time, Dr. George H. Horn would express his belief that the study of a hitherto unregarded organ in any series of living things would ultimately improve and correct the taxonomy of that same series as previously established on other characters.

Recent tendencies seem to incline to Horn's view rather than to Cope's. Prof. Castle has expressed these tendencies thus:

> If we compare one wild species with another, we commonly find existing between them not single striking differences but numberless minute differences.....if one makes an intensive study of related species, he finds that they differ in endless details of structure and physiological behavior extending even to differences in size of the constituent cells of the body (Conklin), or of their parts (chromosomes, chromomeres, etc.). (*Science*, Jan. 15, 1915, p. 96.)

Prof. McClung tells us of having corrected a false label on a microscopic slide of sections of a grasshopper's testis by recognizing the differences in the chromosomes of the species really present and of that which it purported to be.

In a recent obituary of Prof. C. S. Minot we have quoted his conclusion "even a piece of cuticle suffices for the identification of the species" of a Lepidopterous larva.

The minuter differences, the finer discriminations, these are the signs of the times in taxonomy and Prof. Castle, in the article from which our quotation is made, shows in a most interesting way how these small differences are related to the possibilities in evolution.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Photographs received for the Album of the American Entomological Society.

During the year 1914 photographs for the album were received from the following persons, and the members of the Society wish again to thank the donors for their much appreciated gifts: E. D. Ball, E. W. Beyer, J. C. Crawford, N. Criddle, L. G. Esson, C. T. Greene, W. D. Kearfott, W. W. Newcomb, A. F. Porter, S. A. Rohwer, Mrs. P. R. Uhler, A. C. Watson, J. B. Watson, T. N. Willing.

The Occurrence of Pediculopsis graminum Reuter and the Carnation Bud-Rot in New Jersey (Acar.)

During the fall of 1914 carnation buds in several greenhouses in northern New Jersey were observed to be deformed and somewhat lop-sided. Upon cutting them open the interior was found to be decayed and contained as a rule one or more female mites with greatly distended bodies. White varieties of carnations seemed to suffer the most. According to Stewart and Hodgkiss, the rot is caused by a species of fungus (*Sporotrichum poae*) which also causes the silver top of June grass and the mite has been found accompanying the disease in both cases. It appears that the mites bearing the disease spores are carried into the house in summer in the soil and enter the immature flower buds as soon as they appear. The spores therefore find a favorable place in which to develop and decay finally sets in. Treatment consists in promptly picking and burning all infested buds. Accounts of this trouble can be found in Tech. Bull. No. 7, N. Y. Agric. Exp. Sta., Bull. No. 103, Neb. Agric. Exp. Sta., and the 27th Report of State Entomologist of Illinois.—HARRY B. WEISS, New Brunswick, N. J.

An Insect's Femur as a Fish Hook (Orth.).

A curious use is made of the spine on the hind femur of the Phasmid, *Eurycantha latro*, by the natives in the hill-villages of northern Goodenough Islands, near New Guinea. The femur is strung on the end of a fishing line, so that the recurved spine will act as a fish-hook barb. [See H. Balfour's article and illustration in *Man*, Feb., 1915.]

Proposed Entomological Work in Porto Rico.

Professor John H. Gerould, of Dartmouth College, Hanover, New Hampshire, expects to go to Porto Rico with Dr. A. G. Mayer's party on May 15, returning to New York, June 21, to study the Lepidoptera and other insects of the island with a view to undertaking breeding experiments upon stock from the tropics.

Linguatula serrata (larva) in a Native Central American. (Arachnida).

Two cases of infection by linguatulids have been observed at Ancon Hospital during the past six years and while the condition is not uncommonly met with at autopsy in Europe, and while infections by other representatives of the Linguatulidae—*Porocephalus armillatus* and *moniliformis,* have been reported from Africa and Asia, the literature appears to afford no example of an infection by *Linguatula* in a native of America.

In the case reported here a post-mortem examination was being held on the body of Leonidas, T., aged 32, a native of Nicaragua. He had been in Guatemala fourteen months ago, where he lost an arm during one of the revolutions there. It can not be ascertained with accuracy how long he had been in the Canal Zone, for he was not an employee. He entered the hospital at Paraiso and had evidently been on the trails for a couple of days (Dr. Preston). The patient was transferred to Ancon Hospital, August 29, 1911, and died September 15, 1911. During the autopsy, immediately after the lungs had been removed and excised, a larva was found crawling over the cut surface and along the pleura. As this was the only larva found, its exact location during the life of the patient is not known. The larva, no doubt, while parasitic, was harmless, and played no part whatever in the cause of death, which was cirrhosis of the liver.

The larva was active and crawled about very much like a fly larva. Its activity was retained after being five to six hours in a saline solution under a cover slip. Its color was white, becoming grayish and translucent when mounted temporarily under a cover slip with saline solution. Its body was 6.5 mm. long; its greatest width 1.52 mm.; it was flattened and tapered to an obtuse point posteriorly. It was encircled transversely by alternate rows of pores and retrorse, colorless, chitinous spines.—[Further description is given.]

In 1905, one of us (S. T. D.) saw a larva very much like the one just described. The specimen was seen in a film preparation from a stool. It is believed the patient was a white man, either a native of or long resident in Central America.—Dr. S. T. Darling and Dr. H. C. Clark in Proceedings of the Canal Zone Medical Association, Vol. IV, pt. II, pp. 11-14. Date of publication not given.

Identification of Specimens.

The following desire to be added to the list of those willing to determine material from North America in their respective groups. (See this volume of the News, pages 33, 35, 85 and 133 for further information and for directions for sending specimens.)

Coleoptera.—*Cerambycidae*: W. S. Fisher, 1337 Parkwood Place, N. W., Washington, D. C.; *Certain families*: C. A. Frost, 26 Pond Street, Framingham, Mass.

Data Wanted on Migrations of the Cotton Worm Moth (Lep.).

Prof. John H. Gerould, Dartmouth College, Hanover, New Hampshire, desires data bearing on the appearance of swarms of *Alabama argillacea* in the Northern States. He has recently reported such a phenomenon which occurred at Hanover on October 12, 1912, and correlated it with records of this species at other localities, and with prevailing weather conditions, in an article to appear in *Science*.

A mite parasitic on the Musk Rat. (Arachnida, Acarina).

Last year Messrs. M. Printz and L. I. Miller found specimens of a remarkable mite on a musk rat (*Fiber zibethicus cinnamominus* Hollister) on the Brighton road in Adams County, Colorado. I determined it as *Laelaps multispinosus* Banks, and this identification was later confirmed by Mr. Banks. The species was described from Canada, and is new to the United States.—T. D. A. Cockerell, Boulder, Colorado.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

3—The American Naturalist. **4**—The Canadian Entomologist. **6**—Journal of the New York Entomological Society. **9**—The Entomologist, London. **11**—Annals and Magazine of Natural History, London. **45**—Deutsche Entomologische Zeitschrift. **50**—Proceedings, U. S. National Museum. **59**—Sitzungsberichte, Gesellschaft der naturforschenden Freunde, Berlin. **68**—Science, New York. **79**—La Nature, Paris. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **123**—Bulletin of the Wisconsin Natural History Society, Milwaukee. **161**—Proceedings, Biological Society of Washington. **184**—Journal of Experimental Zoology, Philadelphia. **211**—Popular Science Monthly, Lancaster, Pa. **239**—Annales, Biologie Lacustre, Brussels. **279**—Jenaische Zeitschrift fur Naturwissenschaft. **284**—Bulletin, Museum National d'Histoire Naturelle, Reunion Mensuelle des Naturalistes du Museum, Paris. **344**—U. S. Department of Agriculture, Washington, D. C. **399**—Proceedings of the Cambridge Philosophical Society, Cambridge, England. **447**—Jour-

nal of Agricultural Research, Washington. **480**—The Annals of Applied Biology. **499**—Transactions, Wisconsin Academy of Sciences, Arts and Letters, Madison. **500**—Bulletin Trimestriel, Societe d'Histoire Naturelle . . . de Toulouse. **501**—Rivista Coleotterologica Italiana.

GENERAL SUBJECT. Brunner v. Wattenwyl.—Obituary notice, **45**, 1914, 570. **Gilles & St. John**—Use of formalin in setting insects, **9**, 1915, 41-2. **Grossbeck, J. A.**—John Arthur Grossbeck, with a bibliography of his published writings, by W. T. Davis, **6**, xxii, 271-75. **Howard, L. O.**—Report of the entomologist, **344**, Rept. of Secretary, 1914, 183-98. **Kellogg, V. L.**—Insects of the Pacific, **211**, lxxxvi, 265-9. **Thompson, W. R.**—The cuticula of insects as a means of defence against parasites, **399**, xviii, 51-5.

PHYSIOLOGY AND EMBRYOLOGY. Castle, W. E.—Selection, sugar-beets and thrips, **3**, xlix, 121-2. **Hoge, M. A.**—The influence of temperature on the development of a mendelian character, **184**, xviii, 241-98. **Liff, J.**—Data on a peculiar mendelian ratio in Drosophila ampelophila, **3**, xlix, 97-120. **Newell, W.**—Inheritance in the honey bee, **68**, xli, 218-19. **Zeleny & Faust**—Size dimorphism in the spermatozoa from single testes, **184**, xviii, 187-240.

MEDICAL. Howard, L. O.—Dr. A. F. A. King on mosquitoes and malaria, **68**, xli, 312-15.

ARACHNIDA, ETC.

Caesar, L.—An imported red spider attacking fruit trees, **4**, 1915, 57-8. **Petrunkevitch, A.**—Attidae of the Yale Dominica expedition, **6**, xxii, 329-31.

NEUROPTERA, ETC. Awati, P. R.—The apple sucker, with notes on the pear sucker, **480**, i, 247-72. **Boyer, M. A.**—La mue chez un Thysanoure du genre Machilis, **500**, xlvi, 92-8. **Cummings, B. F.**—Note on the mouth-parts of a species of Polyplax (Anoplura) and on the relationship between Anoplura and Mallophaga, **11**, xv, 256-9. **Heiner, H.**—Zur biologie und anatomie von Cloëon dipterum, Baetis binoculatus und Habrophlebia fusca, **279**, liii, 289-340. **Marshall, W. S.**—On the anatomy of the dragonfly, Libellula quadrimaculata, **499**, xvii, 755-90.

HEMIPTERA. Hargreaves, E.—The life-history and habits of the greenhouse white fly (Aleyrodes vaporariorum), **480**, i, 303-34. **Williams, C. B.**—The pea thrips (Kakothrips robustus), **480**, i, 222-46.

Funkhouser, W. D.—Report on a collection of Membracidae from the Colombian Andes, taken by J. T. Lloyd, **6**, xxii, 275-81. **Jacobi, A.**—Bemerkungen ueber Jassinae (Homoptera Cicadoidea), **59**, 1914, 379-83. **Patch, E. M.**—Two clover aphids, **447**, iii, 431-33.

LEPIDOPTERA. Davis, W. T.—Some additions to the New Jersey list of L., **6**, xxii, 332-3. **Swett, L. W.**—Geometrid notes—Description of a new variety [of Hydriomena speciosata], **4**, 1915, 64.

DIPTERA. Scott & Lamb—The early stages of Paltostoma schineri, with a description of the female, **11**, xv, 181-202.

Alexander, C. P.—Description of new sps. of crane-flies from Central America, **50**, xlviii, 441-4. **Brues, C. T.**—A synonymic catalogue of the dipterous family Phoridae, **123**, xii, 85-152. **Johnson, C. W.**—A n. sp. of the genus Nephrocerus [N. slossonae], **4**, 1915, 54-6. **Malloch, J. R.**—Synopsis of N. American species of the genus Bezzia (Chironomidae) [3 new], **6**, xxii, 281-5. **Townsend, C. H. T.**—Proposal of new muscoid genera for old species [60 new names], **161**, xxviii, 19-24.

COLEOPTERA. Barber, H. S.—The breeding place of Dermestes elongatus, **161**, xxvii, 145-46. **Brocher, F.**—Recherches sur la respiration des insectes aquatiques adultes. Les Dyticides (second article), **239**, vii, 5-39. **Della Beffa, G.**—Anomalie cromatische osservate nello studio dei Coccinellidi, **501**, xii, 139-48. **Leuderwaldt, H.**—Zur lebensweise brasilianischer Cicindeliden, **92**, xi, 25-7. **Stellwaag, F.**—Die alula der kaefer, **45**, 1914, 419-34.

Grouvelle, M. A.—Mission geodesique de l'Equateur. Insectes recueillis par M. le Dr. Rivet. Coleopteres clavicornes, **284**, 1914, 43-56. **Kerremans, Ch.**—Note sur divers C. Buprestides des collections du Museum d'Histoire Naturelle de Paris; Collections recueillies . . . dans la Republique Argentine, C. Buprestides, **284**, 1913, 575-80; 580-89. **Leng, C. W.**—A n. sp. of Arthromacra with notes on other species of Lagriidae; Balaninus quercus Horn, **6**, xxii, 285-90; 332. **Olivier, M. E.**—Collections recueillies par M. E. R. Wagner dans la Republique Argentine, C. Lampyrides, **284**, 1913, 573-5. **Pierce, W. D.**—Descriptions of some weevils reared from cotton in Peru, **344**, Secr. Rept. No. 102. **Schaeffer, C.**—A short review of the No. American species of Onthophagus [1 new], **6**, xxii, 290-300.

HYMENOPTERA. Boenner, W.—Der temporare soziale hyperparasitismus von Lasius fuliginosus und seine beziehungen zu Claviger longicornis, **92**, xi, 14-20. **Coupin, H.**—La guerre chez les fourmis, **79**, 1915, 62-4.

Banks, N.—New sps. of Psammocharidae [13 new], **6**, xxii, 300-6. **Cockerell, T. D. A.**—Bees from Ecuador and Peru, **6**, xxii, 306-28. **Forel, A.**—Einige amerikanische Ameisen [5 new], **45**, 1914, 615-20.

Rohwer, S. A.—Synopsis of the species of sawflies belonging to the genus Dimorphopteryx [3 new], **50**, xlviii, 445-8. **Schrottky, C.** —Beschreibung einer neuen Crabronide aus Paraguay; Einige neue bienen aus Sud-Amerika, **45**, 1914, 624-5; 625-30.

Doings of Societies.

FELDMAN COLLECTING SOCIAL.

Meeting of November 18th, 1914, at the home of H. W. Wenzel, 5614 Stewart St., Philadelphia. Eleven members were present. Pres. H. A. Wenzel in the chair.

Lepidoptera. Mr. Daecke exhibited ten specimens of *Erannis tiliaria* Harr. from Harrisburg, Pennsylvania, October 23, 24 and 26, 1914, showing great individual variation. Stated that in the minutes printed in ENT. NEWS xxv, p. 431, 1914, "Force Mt." should be "Fourth Mt."

Coleoptera. Mr. H. W. Wenzel exhibited specimens of Ambrosia Beetles, *Xyleborus celsus* Eich. from Upper Darby, Pa., October 24, 1914. Said they were deep boring Scolytids and very hard to get, the specimens shown having been chopped from dead hickory six or seven inches below the surface of the wood by H. A. Wenzel and Mr. Kaeber.

Diptera.—Mr. Harbeck exhibited a pair each of the four species of *Proctacanthus* recorded from New Jersey, viz.: *philadelphicus* Macq., *nigriventris* Macq., *brevipennis* Wied. and *rufus* Will. and called attention to the difference between *philadelphicus* and *nigriventris* which were confused in collections under the name of the former until Prof. Hine separated them after examining New Jersey specimens sent him by Mr. Harbeck.

Adjourned to the annex.

Meeting of December 16th, 1914, at the same place. Eleven members were present; Pres. H. A. Wenzel in the chair.

Dr. Skinner stated that during the recent storms the ice was an inch thick on the trees about his home in Ardmore, many limbs being broken off by its weight which he thinks will have great effect on insect life.

Lepidoptera. Mr. Daecke exhibited the workings of the

larvae of *Sthenopis argenteomaculata* Harr. in alder from Harrisburg, Pennsylvania, but instead of breeding the moth he had gotten a Sarcophagid (Dip.) parasite June 10, 1914, and wondered how the fly deposited its eggs upon the moth larvae. Dr. Skinner said one peculiarity of this moth was that though it was nocturnal it is never attracted to light. Mr. Laurent said he had caught one by sugaring.

Diptera. Mr. Daecke also said he had found scale insects infested with a Lepidopterous larva which he had placed in a case by itself and was surprised to breed a fly: *Drosophila repleta* Woll. Mr. Harbeck exhibited a dozen species of *Exoprosopa* and *Anthrax* collected by Mr. Woodgate in Jemez Mts., New Mexico.

Coleoptera. Mr. H. W. Wenzel said that since the end of October, 1914, H. A. Wenzel and he have collected more specimens and species of Cioidae than all the collections in Philadelphia contain together. These were exhibited. Dr. Castle said he had been working on the Staphylinidae and had collected at Morton, Pennsylvania, June 15, several specimens of *Oxyporus 5-maculatus* LeC. which he said is closely allied to the Canadian species *O. occipitalis* Fauv.

Hymenoptera. Mr. H. A. Wenzel exhibited five nests of the Potter Wasp, *Eumenes fraternus* Say, found at Naylor's Run, Delaware Co., Pennsylvania, July 12 on young hickory. These bred from August 4 to 11 except one from which a Dipterous parasite emerged July 30.

Adjourned to the annex.

Meeting of January 20th, 1915, at the same place. Eleven members were present. Messrs. Rohwer, Crawford and Cushman, of Washington, D. C., visitors. Pres. H. A. Wenzel in the chair.

The President read his annual address which was ordered to be incorporated in the minutes.

The present officers were re-elected to serve for 1915 and are as follows: *President,* H. A. Wenzel; *Vice-President,* W. S. Huntington; *Treasurer,* H. W. Wenzel; *Secretary,* George M. Greene, and *Assistant Secretary,* J. W. Green.

Hymenoptera. General discussion on *Vespula* and their nests. Mr. Daecke said he had seen a nest of *maculata* in the mountains near Harrisburg, Pennsylvania, that, instead of being suspended from a limb, was built against the trunk of a tree (about two feet in diameter) four feet above the ground.

Diptera. Mr. George M. Greene exhibited a specimen of *Callicera johnsoni* Hunter which he collected in Fairmount Park, Phila., and said he understood it was the seventh specimen recorded. The type was taken in Fairmount Park by Charles T. Greene, May 7, 1895, resting on the ground on the east side of the Schuylkill River. The specimen shown was collected May 7, 1914, resting on a tree on the west side of the river, directly opposite where the type was taken.

Hemiptera.—Mr. Laurent exhibited his collection of Cicadidæ in which all the species known to occur in New Jersey and Pennsylvania with the exception of one were represented. He stated that the reason the males outnumber the females in collections was owing to the fact that the males alone produce the call or song, thus enabling the collector to locate them.

Adjourned to the annex.—GEORGE M. GREENE, *Secretary.*

THE ENTOMOLOGICAL SOCIETY OF FRANCE AND THE WAR.

At the meeting of October 14, 1914, the President, M. Ch. Alluaud, said: "My dear Colleagues, Since our last reunion [July 22] the greatest armed conflict that history has yet recorded has broken out, the greatest peril that our country has ever run has menaced us. I ask you, since our ancestors of 1870-71 have set us a good example, not to interrupt the course of our meetings under any pretext and to come in as great numbers as possible on the stated days. Your officers make every effort to assure the publication and distribution of the *Bulletin*....and count, as usual, on your observations and your work. In reading the minutes of our meetings of the winter of 1870-71, I met this passage in the address of Dr. Laboulbène (meeting of Jan. 11, 1871) and I ask your permission to reproduce it literally: 'Our session to-day will perhaps be troubled by the explosion of hostile projectiles, some of which have fallen some paces from this house....' You will agree, gentlemen, that it is a case of repetition, that history

is an eternal recommencement. In place of a siege we have the 'tauben'—sinister passenger pigeons—one of which dropped a bomb, the day before yesterday, in the Rue Guy-de-Labrosse, very near the Museum of Natural History."

The following members of the Society are serving in the Army: Dr. R. Jeannel, secretary; Dr. Maurice Royer, first assistant secretary; J. Sainte-Claire Deville, *L. Semichon, J. Surcouf, J. Achard, A. Magdelaine, Joseph de Muizon, Georges Koechlin,* Dr. Maurice Bedel, G. Billiard, V. Laboissière, A. Mequignon, Dr. L. Bettinger (whose collection was destroyed in the bombardment of Rheims), L. Beguin. G. Babault (recently returned from an expedition in the Himalayas), P. Chabanaud, A. Lavallée, L. Legras, P. Vayssière, J. Vincent, *J. Aubail,* J. Hervé-Bazin, E. Roubaud and E. Dattin. [Those whose names appear in italics have been wounded in action. Elsewhere in this NEWS the names of those killed in battle are given.]

At the end of the meeting of Nov. 11, 1914, "M. A. Bourgoin, considering that the closing of the cafés at 8 o'clock deprives us of the traditional 'humid session,' proposed to contribute to the 'soldiers' tobacco fund,' the savings to be realized from this fact. This generous thought of our Archivist-Librarian was adopted and the collection produced a sum which will procure for thirty-two of our brave soldiers in the bottom of their trenches the joy of receiving each a package of 'caporal.'"

At the meeting of July 22 the Passet Prize was unanimously voted to P. de Peyerimhoff for his memoirs on the larvae of Coleoptera. (*Bulletin,* 1914, Nos. 14-17).

OBITUARY.

[From recent numbers of the *Bulletin* of the Entomological Society of France for 1914, we learn of the death of the following entomologists.]

HENRI ACHARD DE BONVOULOIR died at Paris, July 13, 1914, at the age of 75 years. Undertaking the study of the Coleoptera when a young man, under the direction of C. Jaquelin Duval, he first turned his attention to the Throscidae, of which he produced a monograph in 1859. After some additional papers on this group in 1860 and 1862, he turned his attention to the Eucnemidae. His monograph of this family was published by the French Society in four parts from 1871 to 1875 and amounts to 908 pages and 42 plates. He became

a member of the Society March 9, 1859, and served as its Archivist and Librarian. A bibliography of his entomological writings (10 titles) is given in the *Bulletin* cited, No. 14.

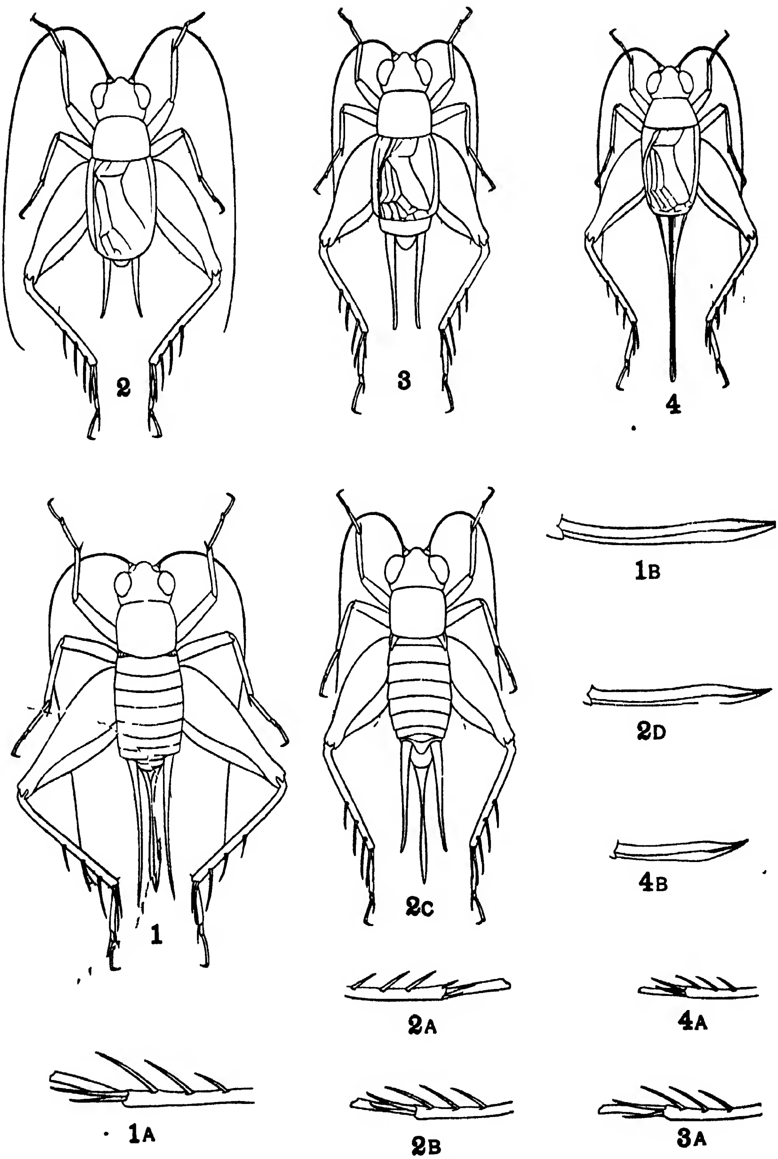
JEAN PEREZ, known for his work on bees, died at St. Georges de Didonne, Charente Inferieure, in the beginning of September, 1914. He was professor in the faculty of Sciences of Bordeaux.

PIERRE EMILE GOUNELLE died at Paris, October 2, 1914, aged 64 years. Beginning in 1884, he made a number of entomological explorations in Brazil, and he has left to the Museum of Paris a very fine collection particularly rich in South American Cerambycidae and in examples of mimicry. His numerous writings relate chiefly to Brazilian Cerambycidae. He bequeathed 10,000 francs, his entomological and other scientific books and his collection of humming-birds to the Entomological Society of France, with permission to sell the collection and such of his books that the Society does not wish to retain. Bibliographies of MM. Perez and Gounelle are promised in future numbers of the *Annales* of the Society. (*Bulletin* cited, nos. 15, 16).

LEON VIBERT, lieutenant colonel in the geographical service of the French army died at Paris, August 24, 1914, at the age of 51 years. In the course of his topographical work in Algeria and southeastern Tunisia he contributed to knowledge of the entomological fauna of North Africa (*L. c.* No. 15).

ALBERT CHEUX, a life member of the Society who died at La Baumette, near Angers, July 5, 1914, bequeathed to the Society his collection of Lepidoptera and his entomological library. (No. 17).

The following members of the Society have fallen in the present war: RAYMOND MORGON, ANDRE VUILLET (at Ippecourt, Sept. 10), LEON GARRETA and JEAN CHATANAY.



HYGRONEMOBIUS—HEBARD.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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CONTENTS:

The Genus Hygronemobius, with the Description of One New Species (Orthop., Gryllidae).

By MORGAN HEBARD, Philadelphia, Pa.

(Plate VI.)

In studying series of South American Gryllidae, we find that the majority of forms of diminutive size and abbreviate tegmina described as members of the genus *Nemobius* belong instead to the present genus.[1] Those of which we have material are treated below; in addition to these we find that *Nemobius basalis* of F. Walker[2] is described as having 3 spines on the dorsal margins of the caudal tibiae and, in consequence, almost certainly belongs to the present genus. *Hygronemobius* has 3 and 3 spines on the dorsal margins of the caudal tibiae, the distal spurs numbering 3 external and 2 internal; *Nemobius* has 4 and 4 spines and 3 pairs of distal spurs. These

1. *Hygronemobius* Hebard, Ent. News, XXIV, p. 451. (1913). [♂ of *H. alleni* figured.]
2. Catal. Dermapt. Saltat. Br. Mus., I, p. 58. (1869). [♀, Pará, Brazil.]

features are constant in these genera, but have been almost entirely overlooked in the past. It is, in consequence, impossible for us to place with certainty *Nemobius araucanus*[3] and *nemoralis*[4] of Saussure, though, from the tegminal and other described characters, we believe that examination of the types will prove them to be members of *Hygronemobius*.

KEY TO THE SPECIES OF HYGRONEMOBIUS.

A. Size large (length of body given as 10 mm.)..*basalis* (F. Walker)

AA. Size small, form compact, head and pronotum stout, wings absent.

B. Maxillary palpi dark. General color dark brown, maculate with a still darker shade.

C. Dorso-internal spur of caudal tibia equalling metatarsus in length. Tegmina: ♂, covering 2/3 of abdomen; ♀, minute lateral pads almost entirely concealed by pronotum. Ovipositor with dorsal margin of apex finely serrulate .... *alleni* (Morse)

CC. Dorso-internal spur of caudal tibia reaching 4/5 of distance to distal extremity of metatarsus. Tegmina: ♂, covering all but apex of abdomen; ♀, very small lateral pads. Ovipositor with apex unarmed..........*liura* new species

BB. Maxillary palpi white, with apex of last joint broadly, and ventral margin of same narrowly, marked with black. General color pale brownish maculate with a darker shade. [Tegmina: ♂, covering 2/3 of abdomen, sharply and transversely truncate; ♀, squamiform, lateral, from Saussure]. Dorso-internal spur of caudal tibia reaching about ¾ of distance to distal extremity of metatarsus..................*dissimilis* (Saussure)

AAA. Size very small, form delicate, head and pronotum proportionately small, wings very elongate. (Maxillary palpi white. Dorso-internal spur of caudal tibia reaching about 2/3 of distance to distal extremity of metatarsus, these members all very delicate. Tegmina: ♂, sharply truncate but broadly rounded; ♀, truncate, with greatest production weakly indicated at sutural margin. Ovipositor with apex unarmed. General coloration sooty, with paler portions brownish; wings whitish when in repose; in general appearance not nearly as maculate as any of the other species.)
albipalpus (Saussure)

. Of the four species before us, *alleni* and *liura* appear to be the most nearly related, though showing the widest difference

3. Miss. Sci. Mex., Rech. Zool., VI, p. 388. (1874).
4. Miss. Sci. Mex., Rech. Zool., VI, p. 390. (1874).

in the ovipositor; *dissimilis* shows a general resemblance to these in form, while *albipalpus* is very distinctive in size, form and general coloration, showing, in fact, a decidedly closer general superficial resemblance to one species of South American *Cyrtoxipha* (*guyennensis* Saussure).

When compared with *Nemobius*, the species of the present genus show other differences besides those of the armament of the caudal femora; in the greatly reduced apical area of the male tegmina and the greater divergence of the two axillary veins; in the wholly absent or very greatly reduced tegmina in the females of several species, and in the ovipositor, which in some of the species is wholly unarmed.

But one species, *Hygronemobius alleni*, genotype, is known from within the boundaries of the United States, having been recently found by us in extreme southern Florida.

Hygronemobius alleni (Morse).

1905. *Nemobius alleni* Morse, Psyche, XII, p. 21. [2♂, 2♀, Moraine Cay, Bahamas.]

Nearest in relationship to *H. liura*, the present species may be readily separated, particularly in the female sex, by the characters given in the accompanying key. The original description is excellent but the minute lateral tegmina of the female were unfortunately overlooked.[5]

In addition to that portion of the typical series which has not been destroyed, we have had before us the following series, found on the black soil and among drift in a mangrove swamp near Miami, Florida. At high tide this area was under more than a foot of water. The series was taken when the tide was out, after long and laborious search; at the time the weather was cool and the individuals were not rapid in their movements, but were difficult to capture owing to the environment, their sombre coloration and their habit of hiding under the drift or the sodden mangrove leaves. About the same time, however, a species of *Nemobius* was found in a similar

5. At the time the generic description was written, both adult females of the typical series had been destroyed and it was then supposed that the description of this sex was based on specimens in the instar preceding maturity.

mangrove swamp, where individuals sprang about with astounding rapidity. Several other mangrove swamps about the shores of Biscayne Bay were carefully examined without a trace of the present species being found.

Miami, Florida, March 15 and 16, 1915 (M. Hebard), 1 ♂, 7 ♀, 6 juv. ♂, 4 juv. ♀ [Hebard Cln.].

Hygronemobius liura[6] new species.

TYPE: ♂; Tukeit, British Guiana. July 21, 1911. F. E. Lutz. American Museum of Natural History.

Size small; form compact. Head with interantennal protuberance very feeble, more so than in *H. alleni;* maxillary palpi compact, entirely dark. Pronotum much as in *alleni.* Tegmina reaching base of abdomen, distal margin strongly truncate and very briefly but strongly deflexed, veins very weak, cordes and diagonal vein connected at their extremities by a very weak transverse vein, tambourine absent. Wings absent. Caudal face of cephalic tibiae bearing a large elliptical tympanum, corresponding portion of cephalic face not swollen. Caudal femora as given in generic description; the three spines on each of the dorsal margins are however not literally paired but alternating; distal spurs not as long as in *alleni,* dorso-internal spur (longest of the five distal spurs) reaching only four-fifths of the distance to the distal extremity of the metatarsus (in *alleni* this spur equals the metatarsus in length).

Allotype. Same data as type.

Agrees with the types except in the following sexual features. Tegmina greatly aborted, visible portion almost wholly lateral in position (so much so that the tegmina can scarcely be seen from the dorsal aspect), triangular in outline with angle (disto-lateral in position) broadly rounded. Ovipositor subrect; apex with margins unarmed, dorsal margin very weakly subconcave below line of dorsal margin of shaft, ventral margin very weakly convex from proximal swelling to the very sharp apex.

Coloration. ♂. Very dark brown; very weakly punctate and mottled with a paler and more reddish shade, this mottling more evident on the caudal femora. Tegmina glossy and piceous; intermediate channel cream-buff, this marking continued as a rather broad transverse band margining the tegmina distad, a spot of the same color at the base of the free margin of the dorsal field.

6. From λεῖα smooth and οὐρὰ tail. A substantive alluding to the ovipositor difference between this species and the species of nearest relationship, *alleni.*

♀. Head, pronotum and limbs more decidedly marbled with the paler and more reddish brown. Abdomen dark brown, faintly and very widely punctate with a paler shade. Tegmina very dark brown with a buffy marking filling the brief exposed portion of the dorsal field.

MEASUREMENTS (IN MILLIMETERS)

	Length of body	Length of pronotum	Caudal width of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
Type, ♂........	6 8	1.6	1.8	8.1	4.8	....
Allotype, ♀....	6.	1.7	1.8	0.6	4.4	3.6

The series before us, in addition to the type and allotype, may be considered paratypic.

Specimens examined, 5; 3 males and 2 females.

Tukeit, British Guiana, VII, 18 to 21, 1911 (F. E. Lutz), 2 ♂, 2 ♀ [Am. Mus. Nat. Hist.].

Rockstone, British Guiana, VII, 9, 1911 (Crampton and Lutz), 1 ♂ [Am. Mus. Nat. Hist.].

Hygronemobius dissimilis (Saussure).

1874. *Nemobius dissimilis* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 387. [♂, ♀, Brazil.]

1901. *Nemobius speculi* McNeill, Proc. Wash. Acad. Sci., III, p. 503. [2 ♂ and 20 immature individuals, Tagus Cove, Albemarle Island, Galapagos Islands.]

McNeill's description and figures leave little room for doubt as to the synonymy of his *N. speculi* with the present species. The two adult males described by him agree in all essential details with those before us. That author gives 3 and 3 spines for the margins of the caudal tibiae and 6 spurs, apparently overlooking the absence of the ventro-internal spur, a characteristic of the present genus. The specimens are given as 5 mm. in length.

When compared with *H. alleni* and *H. liura,* the present species is found to be a smaller insect, agreeing in the robust form and nearly quadrate dorsum of the pronotum. It is much paler in general coloration, but the males before us have the lateral lobes of the pronotum broadly banded with blackish

brown with a few scattered dots of the paler general coloration and the lateral field of the tegmina almost entirely piceous; these markings are simply described as brown by Saussure and McNeill, though the latter refers to the dots in the dark portion of the lateral lobes. In other respects our material agrees fully with Saussure's original description, in which unfortunately the number of spines and spurs of the caudal tibiae are not mentioned, though the length of the dorso-internal spur is given.

MEASUREMENTS (IN MILLIMETERS)

	Tagus Cove, Galapagos Ids. *Type N. speculi* ex McNeill	Petropolis, Brazil.	Brazil. *Types*, ex Saussure	
	♂	♂	♂	♀
Length of body	"5.	5.8-6	"6.5	7.5
Length of pronotum	....	1.4	1.6	1.6
Caudal width of same	....	1.9	2.	2.5
Length of tegmen	2.5	2.8-3.	3.	1.
Length of caudal femur	4."	4.-4.2	4.	4.4
Length of ovipositor	....	......	....	3.2"

Specimens Examined, 2; 2 males.

Petropolis, Rio de Janeiro, Brazil, IV, 12 to 14, 1913 (M. Burr), 2 ♂ [A. N. S. P.].

Hygronemobius albipalpus (Saussure).

1877. *N[emobius] albipalpus* Saussure, Mélang. Orthopt., II, V fasc., p. 257. [♀ Rio de Janeiro, Brazil.]

This distinctive species, previously known only from the type[7], is remarkable in its very small size, graceful form, white maxillary palpi, pronotum which narrows decidedly cephalad, dark sooty markings and very long wings (though, as in the other species of the genus, the tegmina are truncate distad and almost wholly lack the anal field in the male sex). The series

7. The material from French Guiana, recorded by Chopard (Ann. Soc. Ent. France, LXXXI, p. 402, 1912), of which he figures a male, belongs not to this species but to a species of *Nemobius*, probably *trinitatis* of Scudder.

before us shows very little variation in either size or coloration.[8]

MEASUREMENTS (IN MILLIMETERS)

	Bartica, British Guiana		Igarapé Assu, Brazil.		Rio de Janeiro, Brazil. *Type*, ex Saussure
	♂	♀	♂	♀	♀
Length of body	5.8	5.-5.4	5.-5.4	5.8-5.4	"5.
Length of pronotum	1.2	1.-1.2	1.-1.2	1 1-1.2	1.2
Caudal with of same[9]	1.7	1.7-1.8	1.5-1.8	1.5-1.9	2.
Length of tegmen	2.8	2.6-2.8	3.1-3.3	3.1-3 5	3.8
Length of wing	8.3	8.1-9.	8.2-8.8	8.3-8.7	....
Length of caudal femur	3.8	3.8-4.1	3.6-3.8	3.5-4.	3.5
Length of ovipositor	....	2.4-2.8	......	2.2-2.8	2.2"

Specimens Examined, 26; 8 males and 18 females.

Bartica, British Guiana, December 19 to 24, 1912 (H. S. Parish), 1 ♂, 4 ♀ [A. N. S. P.].

Igarapé Assu, Pará, Brazil, January 17 to 23, 1912 (H. S. Parish), 7 ♂, 14 ♀ [A. N. S. P.].

EXPLANATION OF PLATE VI.

The outlines of the entire insect are 4 times natural size; the others are all greatly enlarged.

1. *Hygronemobius alleni* (Morse). Miami, Florida, Female. Dorsal outline.

1A. Same. Lateral outline of caudal tibia, internal.

1B. Same. Lateral outline of ovipositor.

2. *Hygronemobius liura* new species. *Type*. Male. Dorsal outline.

2A. Same. Lateral outline of caudal tibia, external.

2B. Same. Lateral outline of caudal tibia, internal.

2C. *Hygronemobius liura* new species. *Allotype*. Female. Dorsal outline.

2D. Same. Lateral outline of ovipositor.

3. *Hygronemobius dissimilis* (Saussure). Petropolis, Brazil. Male. Dorsal outline.

3A. Same. Lateral outline of caudal tibia, internal.

4. *Hygronemobius albipalpus* (Saussure). Igarapé Assu, Brazil. Male. Dorsal outline.

4A. Same. Lateral outline of caudal tibia, internal.

4B. *Hygronemobius albipalpus* (Saussure). Igarapé Assu, Brazil. Female. Lateral outline of ovipositor.

8. The number of spines of the dorsal margins of the caudal femora is 3 and 3, absolutely constant in the species of the genus examined, as are 4 and 4 in the species of *Nemobius*. Saussure has given in the original description of this species 3 and 4 of these spines; to have obtained this result he must have counted the dorso-internal spur. These spines in the material here studied are not as nearly opposite as in *Nemobius* and are as a result distinctly alternating.

9. This measurement is necessary but one of the most difficult to judge, owing to the necessity of estimating the points on the curve of the pronotum where the dorsum runs into the lateral lobes.

A new Genus and some new Species Belonging to the Dipterous Family Bombyliidae.

By E. T. Cresson, Jr., Academy of Natural Sciences of Philadelphia.

This paper is the result of a brief study of the genus *Geron* in the collection here. The genus seems to divide into two groups which are quite distinct, holding characters, especially one, which the writer considers of generic value. Typically the species of *Geron* have the third joint of the antennae long and tapering to a fine style-like apex. In 1892 Coquillett described two species which he placed in this genus, which have the third joint broadly rounded or truncated apically. Later he described others with the same character. The style in these, instead of being at the apex is in a shallow notch at or near the upper angle of this joint. It is sometimes so minute as to be scarcely discernible. This character, as well as the absence of scales, and the slight difference in the venation, serves as a base of the following new genus. All the previously known species of the group were described by Mr. Coquillett, and are included in the table of species given in this paper.

Fig. 1.—Antenna of *Pseudogeron mitis* (x 55). Fig. 2.—Wing of *Pseudogeron mitis* (x 14). Fig. 3.—Antenna of *Geron* sp. (x 55).

Through the kindness of Mr. Knab, of the United States National Museum, the writer was able to examine the typical specimens of most of the described species.

With the aid of these I am able to construct a table of species which I trust will be practical. On account of the lack of good series of many of the species, the amount of variation is difficult to determine and some of the characters used may not

hold. The presence or absence of yellow margins on the abdominal segments is apparently of little specific value and so is not used to the extent that it has been. There is often considerable variation in the length of the proboscis of specimens of the same species, also in the coloration of the halteres, so these characters should be used with care. In associating the two sexes the possible differences in coloration must be considered.

The material examined from Texas and New Mexico was collected by Messrs. J. A. G. Rehn and H. L. Viereck in the late Spring of 1902. All types of the new species, except where otherwise noted, are in the collection here. The length given for the specimens always excludes the proboscis and antennae.

PSEUDOGERON gen. nov.

Small species, moderately pilose to nearly bare. Head hemispherical, at most broad as thorax. Eyes large, broadly contiguous in the male. Frons in female about one-third width of head in known species. Vertical triangle occupied entirely by the prominent ocellar tubercle. Face medianly, contained in the large oral cavity; the sides more or less broad; lower occiput convex. Antennae situated about on median line of eyes; first joint generally shorter than third; second globose; third much longer than broad, apex rounded and notched at or near upper angle in which is situated the short or minute style. Proboscis exserted, corneous, as long as, or longer than, the head; palpi slender.

Thorax higher than long; strongly convex dorsally, more or less hunch-backed. Scutellum convex, rounded apically. Abdomen conical, broad as thorax, rarely longer. Legs slender without spurs; pulvilli normal; empodium rudimentary. Wings hyaline in known species, with auxiliary first and second veins long, the latter ending in the costa; third branched beyond discal cell, the two members of the branch subequal in length, generally acutely diverging at their bases; second submarginal cell about two to four times as long as broad; three posterior cells present; anal cell closed.

Type species—Pseudogeron mitis sp. nov.

TABLE OF SPECIES.

1. Posterior cross vein oblique, more or less sinuate 2
   Posterior cross vein perpendicular to fourth and fifth veins, straight 5
2. First antennal joint nearly four times the length of second; robust, mostly shining species ....**setosa**
   First joint at most twice the length of second; mostly opake species 3
3. Face pilose; small c. v. at or beyond middle of discal cell.
   Abdomen opake ....**trochilus**
   Abdomen shining black, margins of segments yellow ....**cinctura**
   Face bare; small c. v. far before middle of discal cell 4
4. Large (6.0 mm.) robust species ....**capax**
   Small (3.5 mm.) slender species ....**sigma**
5. Males 6
   Females 11
6. Shining black, at most faintly pruinose below ....**atra**
   Mostly cinereous species 7
7. Mesonotum with distinct broad black vittae ....**mitis**
   Mesonotum cinereous, at most narrowly bivittate or faintly marked 8
8. Third antennal joint broadest before its middle and somewhat tapering apically, tibiae mostly yellow ....**fasciola**
   Third antennal joint broadest beyond its middle, not tapering apically, tibiae black 9
9. Mesonotum densely cinereous, narrowly bivittate with black, with faint sublateral presutural spots ....**bivittata**
   Mesonotum at most faintly marked 10
10. Larger (3 mm.), robust, pilose species ....**knabi**
    Small (2 mm.), slender, nearly bare species ....**obscura**
11. First antennal joint, anterior half of frons, humeri and scutellum yellow ....**knabi**
    These parts black, more or less densely cinereous 12
12. Mesonotum distinctly broadly trivittate with brown; orbits of frons and face yellow ....**formosa**
    Mesonotum narrowly bivittate and with large sublateral spots, subopake, black ....**mitis**
    Mesonotum indistinctly marked or narrowly bivittate 13
13. Mesonotum densely cinereous with median pair of narrow vittae and faint sublateral presutural spot (compare *fasciola*) **bivittata**
    Mesonotum not or faintly trivittate 14

14. Fore tibiae entirely black .... **obscura**
Fore tibiae mostly yellow 15
15. Third antennal joint broadest before middle, tapering apically; larger (3.5 mm.) species .... **fasciola**
Third joint broadest beyond middle, not tapering; smaller (1.5 mm.) species .... **marginalis**

Pseudogeron setosa sp. nov.

♂, Black; halteres brown and yellow; hind margins of abdominal segments yellow. Pile long and yellowish.

Shining; abdomen opake. Frons and face silvery, sides of latter on mesal margin thickly beset with long black bristles, also similar bristles on first antennal joint and on posterior orbits.

Robust species. Proboscis twice as long as head; palpi one-fourth as long. First antennal joint nearly as long as third; third as long as first and second, two and one-half times as long as broad with greatest width at middle. Second vein ending opposite middle of second submarginal; latter broad apically due to the forward curving of the last third of the anterior branch of third vein, so that the length of the cell is hardly twice as long as its greatest width. Small c. v. beyond middle of discal cell; post c. v. oblique and straight.

♀, Destitute of the black bristles on the head, halteres entirely yellow; second submarginal cell longer and the post. c. v. sinuate. Length, ♂, ♀, 5.0 mm.

Holotype—♂, Tahoe, California, August 11, 1905. Type No. 6080.

Allotype—♀, Topotypic.

These specimens have been in alcohol and the pile is matted. Normally, there may be considerable amount of pruinose coating present which is not apparent on the type specimens.

In venation this species is similar to the typical *Geron* but there is no attenuation in the third antennal joint.

Pseudogeron capax.

1892. *Geron capax* Coquillett, Can. Ent., xxiv, 126.

Described from specimens of both sexes from Orange County,* California.

I have examined a male (cotype) and a female from Los Angeles County, California; a male labeled "Cala" and another male bearing label "39." I have not seen the specimens that are responsible for the New Jersey record.

* Orange County is a part of the original Los Angeles County.

Pseudogeron sigma.

1902. *Geron sigma* Coquillett, Proc. U. S. Nat. Mus., xxv, 101, 1903.

Described from both sexes from Alabama, North Carolina and California.

I have examined a female (cotype) from North Carolina and two males from Colorado. That these are conspecific, I will only assume.

Pseudogeron cinctura.

1894. *Geron cinctura* Coquillett, Tr. Am. Ent. Soc., xxi, 111.

Described from both sexes from Southern California.

I have not seen this species. The description suggests *P. setosa*, but the markings of the thorax separate this species, unless perfect specimens of that species show similar markings. Then the length of the antennae may be of value.

Pseudogeron trochilus.

1894. *Geron trochilus* Coquillett, Tr. Am. Ent. Soc. xxi, 111.

Described from both sexes from Southern California.

I have examined 2 ♂ and 1 ♀ from Alamogordo, New Mexico; 1 ♀, El Paso, Texas, April.

Pseudogeron atra sp. nov.

♂, Black, shining; knob of halteres yellow. Sparsely pilose. Proboscis as long as head; palpi more than half as long. First and second antennal joints subequal in length; third one and one-half times as long as broad with greatest width beyond middle. Second vein ending beyond middle of second submarginal; latter four times as long as broad; small c. v. just beyond basal c. v. and far before middle of discal cell; post. c. v. straight. Length, 1.6 mm.

Holotype—♂, Alamogordo, New Mexico, May 7, 1902. Type No. 6081.

Pseudogeron obscura sp. nov.

♂, ♀, Similar to *P. formosa*, but head and legs entirely black. Mesonotal markings similar but much subdued or absent. Yellow margins of abdominal segments very narrow, almost wanting. Second submarginal cell three times as long as broad. Length, 1.6-2 mm.

Holotype—♀, Alamogordo, New Mexico, April 9, 1902. Type No. 6082.

Allotype—♂, El Paso, Texas, March 31, 1902.

Before me is a female from Highrolls, New Mexico, June 3, 1902, which is probably this species, but its condition is not good enough for critical study.

Pseudogeron formosa sp. nov.

♀, Black, frontal and facial orbits, palpi, halteres, hind margins of dorsal abdominal segments and entire venter, trochanters, bases and apices of fore and middle femora and tibiae, and basal veins of wings, yellow. Opake: head and thorax densely cinereous, frons and face with broad black median stripe; occiput brownish medianly. Mesonotum with a broad and two narrow median brown stripes. Scutellum with a median brown spot. Dorsal abdominal segments opake velvety black with hind margins yellow. Legs more or less cinereous.

Bare or nearly so. Proboscis as long as head and thorax together; palpi very short. First and second antennal joints subequal; third, one and one-half times as long as first and second, three times as long as broad, with greater width beyond middle. Second vein ending beyond middle of second submarginal; latter at least four times as long as broad. Small c. v. near base of discal, opposite basal c. v.; post. c. v. straight. Length, 2 mm.

Holotype—♀, Alamogordo, New Mexico, June 26, 1902. Type No. 6083.

Paratype—1 ♀, topotypic.

Pseudogeron mitis sp. nov. Figs. 1, 2.

♂, Black; halteres brown and yellow; hind margins of abdominal segments yellow; basal veins of wings pale.

Opake, mesonotum and scutellum more or less shining. Frons, face and lower occiput densely cinereous. Mesonotum with two well-separated median stripes and broad lateral margins and pleurae densely cinereous, scutellum with cinereous margin. Abdomen densely cinereous with bases of segments more or less opake to subopake, black. Legs sparsely cinereous. All pile white.

Pilose. First antennal joint nearly twice as long as second; third, one and one-half times as long as first and second, three times as long as broad, with greatest width near apex. Proboscis as long as head; palpi half as long. Second vein ending opposite middle of second submarginal; latter three times as long as broad; small c. v. before middle of discal cell and beyond basal c. v.; post. c. v. straight.

♀. Head entirely cinereous. Palpi slightly shorter. Thorax cinereous; mesonotum with two fine median stripes anteriorly and large spot laterally interrupted at suture, another small supraalar spot, all subopake black. Scutellum immaculate. Legs more densly coated. Second submarginal cell slightly longer. Length, ♂, ♀, 3.0-3.8 mm.

Holotype—♂, Alamogordo, New Mexico, May 7, 1902. Type No. 6084.

Allotype—♀, topotypic, April 20, 1902.

Paratypes—7 ♀, topotypic, April 23 to May 1, 1902.

Pseudogeron bivittata sp. nov.

♂, Black; halteres, margins of dorsal and ventral abdominal segments, knees and basal veins of wings yellow. Entirely opake, densely cinereous, sparingly white pilose which is more abundant on abdomen. Frons and face silvery; mesonotum with a median pair of narrow brown stripes, abbreviated posteriorly.

Proboscis as long as thorax; palpi one-fourth as long. First and second antennal joints subequal; third, twice as long as first and second, three times as long as broad, with greatest width at middle. Second vein ending slightly before middle of submarginal; small c. v. before middle of discal cell and far beyond basal c. v.; post. c. v. straight.

♀, Proboscis shorter and palpi longer in proportion. Third antennal joint shorter. Length, ♂, ♀, 3.0-3.5 mm.

Holotype—♂, El Paso, Texas, April 5, 1902. Type No. 6085.

Allotype—♀, topotypic.

Pseudogeron knabi sp. nov.

♂, Black; base of palpi, halteres, margins of abdominal segments, knees, basal veins of wings, costa as far as end of auxiliary and entire first vein yellow. Moderately white pilose, pile long on head and abdomen. Densely cinereous; frons and face silvery; mesonotum blackish, with faint darker sublateral presutural spots.

Face bare above. Proboscis twice as long as head; palpi slightly more than one-fourth as long. First antennal joint hardly longer than second; third three times as long as first, two and one-half times as long as broad with its greatest width at or beyond middle. Second vein at middle of second submarginal; latter two and one-half times as long as broad; small c. v. before middle of discal cell and beyond basal c. v.; post. c. v. straight.

♀, Anterior half of frons, face, first antennal joint, base of palpi, prothorax, humeri, lateral mesonotal margins more or less, scutellum, abdomen except bases of segments, apices of femora and all tibiae yellow; halteres white. Proboscis longer in male. Length, ♂, ♀, 3.0 mm.

Holotype—♂, Las Cruces, New Mexico, October 5, 1895 (T. D. A. Cockerell), [U. S. N. M. Type No. 19222.]

Allotype—♀, topotypic.

Although the two sexes are so different in their coloration, there are characters which determine their association. Such are the venation, yellow bases of palpi and the form of the antennae, as well as the similarity of the data regarding their habitat.

Pseudogeron marginalis sp. nov.

♀, Similar to *P. formosa* but the head entirely black; mesonotal markings obsolete or faintly discernible. The second submarginal cell three times as long as broad. Legs entirely, or all femora, fore and middle tibiae entirely, and bases of their tarsi, bases of hind tibiae, yellow. Length, 1.3-2.0 mm.

Holotype—♀, Alamogordo, New Mexico, May 2, 1902. Type No. 6086.

Paratypes—4 ♀, topotypic, April 26 to May 1, 1902.

Pseudogeron fasciola.

1892. *Geron fasciola* Coquillett, Can. Ent., xxiv, 125.

Described from both sexes from Merced County, California.

I have examined cotypes of both sexes. The species approaches the preceding but differs in the structure of the antennae. This is the only species I have seen in which the third antennal joint is at all tapering from the base to apex. The decided notch and truncate apex decide its generic position.

Data Wanted on the Screw Worm Fly (Dip.).

In connection with the investigations which the Bureau of Entomology is conducting relating to the screw-worm fly, *Chrysomyia macellaria*, the undersigned desires to secure records of the first appearance in spring of adults of this species in various parts of the United States.—F. C. Bishopp, Box 208, Dallas, Texas.

The Cotton Worm Moth in Minnesota (Lep.).

Apropos of the note in the News for April, page 185, the cotton worm moth, *Alabama argillacea,* was present here in the latitude of St. Paul in large numbers, last autumn, and caused a little damage and much anxiety to growers of late-bearing strawberries, because the moths actually attacked the fruit itself, inserting their proboscids into the pulp, and in the estimation of the growers, seriously injuring the berries. This is the first occurrence, to the best of my knowledge, in the last thirteen years, of this moth being found in this latitude in Minnesota.—F. L. Washburn, State Entomologist.

On the External Anatomy of Adelphocoris rapidus Say, with Reference to the Taxonomy of the Miridae or Capsidae (Hemip.).[1]

By H. M. PARSHLEY, Bussey Institution, Harvard University.

(Plate VII.)

During the preparation of this brief discussion of Mirid anatomy, I had occasion to consult the writings of various students of the Hemiptera, and I am, in consequence, able to present evidence which seems to settle definitely the much disputed question regarding the correct name for the family under consideration. Kirkaldy in 1902 adopted the name Miridæ in place of the universally used Capsidæ in accordance with the principle that the family name should be derived from that of the oldest included genus.[2] Others, however, believe that the rule of priority should obtain in determining the family designation, the first name in Latin form thus being the one which should be accepted. Among those who hold this view is Horvath, who in 1911 published a paper[3] in which he attempted to fix the proper names for the several families of Hemiptera. This article[4] furnishes information of value, but some of the names adopted are not consistent with the main principle of the paper. As it happens, it is not necessary to look into the respective merits of these two views in deciding upon the correct name for the family. *Miris* is certainly the oldest genus in the family, and should be the basis for the family name if the oldest genus is to be regarded as the type. On the other hand, the oldest name to be given to the family was *Mirides*,[5] proposed by Hahn[6] in 1831. This term was used in a systematic table in a book with German text, and it is therefore a true Latin form, of which *Miriden* would be the vernacular equivalent.

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[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 87.

[2] *Miris* Fab., 1794; *Capsus* Fab., 1803.

[3] Ann. Mus. Nat. Hung., ix, 1911, p. 1.

[4] Reviewed by Van Duzee, Ent. News, xxii, 1911, p. 431.

[5] Overlooked by Horváth, l. c.

[6] Wanz. Ins., i, 1831, p. 234.

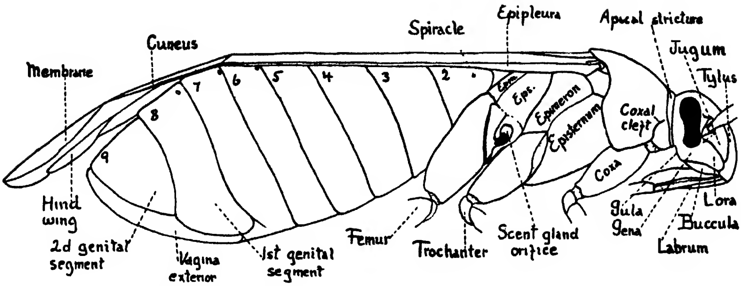

Fig. 1. Lateral view of Adelphocoris rapidus ♀.

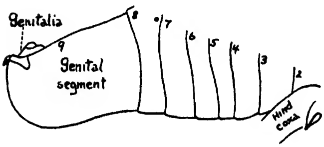

Fig. 2. Abdomen of A. rapidus ♂, right side

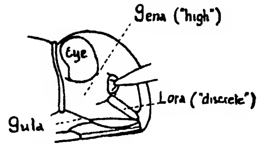

Fig. 9. Diagram of head

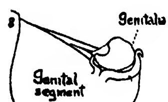

Fig. 3. A. rapidus ♂, left side

Fig. 6 Miris dolobratus.

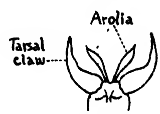

Fig. 10. A rapidus

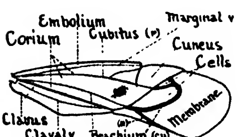

Fig 4. A. rapidus, hemelytron.

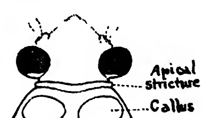

Fig. 7. A. rapidus

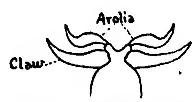

Fig. 11. Monalocoris filicis

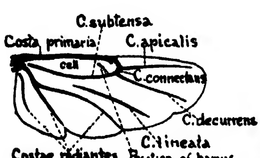

Fig. 5. A. rapidus. hind wing.

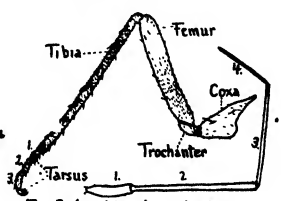

Fig. 8. A. rapidus, leg and antenna.

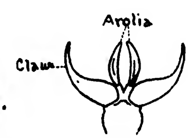

Fig. 12. Lopidea media

Thus it is by no means a vulgar name as suggested by Van Duzee.[7] To conform with modern usage the termination must be changed to *-idae*, but this cannot affect the nomenclatorial standing of the term. Similarly subfamily and tribal names must now end in *-inae* and *-ini* respectively, but no one thinks of ignoring the subfamilies and tribes of Stål and Reuter because these authors used the terminations *-ina* and *-aria* in naming those groups.[8] Reuter, Bergroth, and others[9] have adopted the name Miridae, and we may well follow them since their view seems to be supported by the evidence, from whichever standpoint it may be viewed.

As a basis for this review of the external characters of the Miridae, I have used a common and widely distributed species, introducing such comparative material as I have found available. Most of the technical terms will be found equally applicable in the other families of Heteroptera. Earlier treatments of the subject may be found in the writings of the authors cited, especially in the works of Reuter,[10] which are fundamental for the study of this family.

THE HEAD. (Plate vii, fig. 1.)

The term **tylus** (*clypeus*) may well be applied, as in other families of Heteroptera, to the anterior median portion of the head.[11] The triangular pieces on each side of the tylus may for the same reason be called the **juga** (the *Jochstücke* of Reuter). The **lorae** (*Kopfzügel, maxillary laminae*[12]) lie just inferior to the juga, from which they are set off by an impressed line. Below and posteriorly they may be fused with the genae (*lorae confluent*), as in fig. 1; or they may be marked off by a fine line (*lorae discrete*), as in fig. 9. The **genae** (*Wangen*) are largely occupied above by the eyes. Be-

[7] Can. Ent., xlvi, 1914, p. 386.

[8] A parallel case in the nomenclature of the Formicidae has been brought to my attention by Dr. W. M. Wheeler.

[9] Van Duzee (*in litt.*) now accepts this view.

[10] See especially Acta Soc. Sci. Fenn., xxxvii, No. 3, 1910, p. 84 (Phyl. u. Syst. Mir.)

[11] For a discussion of the true morphological nature of these parts see Muir and Kershaw, Psyche, xviii, 1911, p. 1.

[12] See Tower, Ann. Ent. Soc. Am., vi, 1913, p. 427. Anatomy of the Squash Bug.

low the eyes their vertical width is generally slight, as in fig. 1 (*genae low*), but sometimes (*e. g.* in certain Restheniini), their width is great and may be equal to the vertical diameter of the eyes, as in fig. 9 (*genae high.*). The **bucculae** (*Wangenplatten*) are thin ridge-like plates partially enclosing the base of the four-segmented **rostrum** or beak. The **gula** (*Kehle*) is the posterior median part of the head below. As this part varies greatly in extent and position in different species, it furnishes valuable taxonomic characters. In the Miridae the **antennae**, fig. 8, always consist of four segments, but otherwise, by their great diversity in form, vestiture, and proportions, they present important and easily observable criteria.

The Prothorax.

The anterior margin of the prothorax in certain groups is provided with an **apical stricture**, a complete collar-like annulus set off by an impressed line, figs. 1, 7, 9. In other groups, for instance in the tribe Mirini, the apical stricture is lacking, although sometimes a false and incomplete stricture is formed by the anterior margins of the calli and the humeral impressed lines, as in *Miris*, fig. 6. The **coxal cleft**, fig. 1, also produces at times the impression of a stricture when viewed laterally. In all cases the presence or absence of a true apical stricture should be carefully noted, as this character is of major importance in classification. The **calli** are two more or less raised areas situated anteriorly on the pronotum, figs. 6, 7. The prosternal **xyphus** is a part of the prosternum appearing as a triangular plate between the anterior coxae. In *Adelphocoris* it is limited in front by the apical stricture and is concave with raised margins, while in other groups it may be convex or even conical and without raised margins, thus affording important taxonomic characters.

The Mesothorax. (Plate vii, fig. 1.)

The pleural region is very clearly divided by an oblique line into two parts, furnishing one of the distinctive characters of the Miridae, these structures, when present, being much less clearly defined in other families. The larger and antero-in-

ferior part is the **episternum**, the smaller and postero-superior the **epimeron**.[13] The dividing line is not a true suture, but results from an infolding of the integument for muscle-attachment. It appears significant that the high development of these structures is correlated with the characteristic activity of these insects, which run about with great rapidity and take wing almost as readily as flies. In the Miridae and certain closely related families the **sternum** is composite, the parts being separated by a median longitudinal suture and confluent on the sides with the episterna.

THE METATHORAX. (Plate vii, fig. 1.)

The pleural region is divided as in the preceding segment but here the epimeron is relatively smaller. The **orifices** of the scent glands lie between the middle and hind coxae. They are of very variable form in this family and may be reduced or absent in certain groups. The sternum is composite.

THE ABDOMEN.

The abdomen in the Miridae consists of ten segments, all of which can be seen only in a dorsal view. The **spiracles**, fig. 1, are located laterally, near the dorsal edge of the ventral segments, except the first pair which is on the tergum. The **genital segments** are very different in the sexes, figs. 1, 2, 3, the male being asymmetrical. Good specific characters will doubtless be afforded by the genitalia, but these structures are yet to be investigated in detail.

THE AROLIA.

The parts of the legs, fig. 8, afford a number of characters, all of which are easily observable, except the **arolia**, which require some discussion, being very important taxonomically though somewhat obscure. In *Adelphocoris*, fig. 10, the arolia are to be seen as two elongated membranous structures attached to the end of the last tarsal joint between the claws. They are approximated basally and divergent apically. In *Lopidea*,

[13] This use of these terms corresponds with that common in other orders but hardly agrees with Reuter's statement (l. c. p. 90), where some error, possibly typographical, seems evident.

fig. 12, they are distant basally and convergent apically. In *Monalocoris*, fig. 11, they are distant basally, but diverge widely so that they remain close to the claws throughout their length. In the subfamily Bryocorinae, to which this genus belongs, the arolia are sometimes adherent to the claws for the greater part of their length, and in certain groups they may be entirely absent. These facts may be generalized, giving the following types of arolia:

1. Divergent, approximated at base, fig. 10.
2. Divergent, distant at base, fig. 11.
3. Convergent or parallel, distant at base, fig. 12.

The Wings.

The **hemelytron**, fig. 4, consists of the **clavus, corium, embolim,**[14] **cuneus** and **membrane,** the distinctness of which parts constitutes one of the characters of the family Miridae.[15] The veins of the hemelytra, according to the opinion of Bergroth,[16] should be named morphologically as indicated in parentheses in fig. 4. However, there is some doubt in my mind whether or not this application of the Comstock-Needham terminology is wholly correct, and comparative studies in the Heteroptera are needed to establish fully the homologies involved. Purely systematic terms are not available for all the veins, as only two have received names. Thomson[17] called the outer vein of the corium **cubitus** and the inner **brachium,** and Reuter employs these names because of established usage, though he questions the correctness of the term cubitus.[18] According to the latter author, the brachium, on emerging into the membrane, forms the outer boundaries of the two **cells,** the dividing line between the cells being an extension of the cubitus. The vein of the clavus may be called the **claval** and that near the anterior margin of the wing the **marginal.** The inner longitudinal vein of the membrane has not been used

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[14] Not distinct in *Adelphocoris,* but clearly marked off in other groups, *e. g. Hyaliodes* Reut.

[15] And Anthocoridae.

[16] Ann. Soc. Ent. Belg., lvi, 1912, p. 148, footnote.

[17] Opuscula Entomologica, fasc. iv, 1871, p. 411.

[18] Festschrift f. Palmén, No. 1, 1905, Hem. Spec. I, p. 31.

taxonomically, and, in fact, appears to have been overlooked by Reuter and previous authors as noted by Bergroth (l. c.), who calls it an **anal** vein. Sometimes the membrane is one-celled, and in certain Restheniini several longitudinal veins may be present.

The veins of the metathoracic wing were named by Fieber[19] as shown in fig. 5. Reuter uses the same names, substituting the word *"vena"* for **costa** in each case. In certain groups a short and incomplete vein, the **hamus**, projects backward into the cell from the costa subtensa. This structure is considered by Reuter to be of importance in tracing phylogenetic relationships, its presence indicating a relatively primitive condition. It is absent in *Adelphocoris*, which belongs to the Capsini, a highly specialized tribe of the subfamily Mirinae, but in the figure I have indicated its position as it occurs in *Plagiognathus*, which belongs to the Phylinae, a more primitive group.

Conclusion.

The main anatomical features on which is based the classification of the Miridae may be summarized as follows: The form and structure of the arolia; the presence or absence of the apical stricture of the pronotum; the structure of the lorae; the presence or absence of a wing-hamus; the venation of the membrane, and the extent of the genae. Among the many other characters of lesser import, used in defining the lower groups, may be mentioned the structure of the xyphus; the form and proportions of the antennal segments; the shape of the head, prothorax, and parts of the hemelytra; and the position of the hind coxae. These characters were discovered by various authors, but the determination of their relative importance and their employment in a coherent and comprehensive system are in great measure the work of Reuter. Color and markings are for the most part very variable within specific limits, and this, together with the fact that certain structures also exhibit intra-specific variability, indicates that there is in this family an opportunity for work on incipient species and varieties which will be of general biological interest.

[19] Eu. Hem. 1861, p. 13.

Observations on the Preoviposition, Oviposition and Incubation Periods of Dermacentor nitens in Panama (Arach., Acar.).*

By L. H. DUNN, Board of Health Laboratory, Ancon, Canal Zone.

In January, 1913, Dr. Darling[1] detected in Panama a horse infected with *Piroplasma caballi.* This was the first record of this piroplasma in the New World, and in view of its probable transmission by the tropical horse tick, *D. nitens,* the following observations were made concerning the bionomics of this tick in Panama.

According to Hooker,[2] *D. nitens* passes both molts on the host. Upon the hatching of the larval or seed ticks they attach themselves to a suitable host, and, after engorging themselves with blood, molt without becoming detached from the host. After molting they appear in the nymphal stage and again become engorged with blood and molt for the second time without separation from the host. After the second molt the ticks are in the adult stage and the females after copulation and becoming engorged with blood drop to the ground to deposit their eggs. This makes three blood meals taken from the same host between the larval and adult stages.

This species nearly always adopts horses and mules as hosts —but are sometimes found on other animals—and the ears seem to be the special place of attachment, although they may frequently be found on other parts of the body—as on a horse's neck under the mane—but in such cases they are generally single individuals and not in colonies as they occur in the ears.

A number of *Dermacentor nitens* was collected from a small stray mule found wandering about in Guachapali District. Judging from its condition the mule had evidently been straying about in the "Bush" for some time before coming into Panama, as it was in very poor condition, having several large festering sores on various parts of its body and was also

* Read before The Medical Association of the Isthmian Canal Zone, January 16, 1915.

[1] Jour. Inf. Dis. XIII, No. 2, Sep. 1913, Chicago.

[2] Jour. Econ. Entom., 1908, I, p. 47.

heavily infested with ticks. The inner side of both ears* was a thick mass of attached *Dermacentor nitens* in all stages of development—from small larvae to engorged adult females—but the majority consisted of nymphs. Of the number taken from the ears twelve engorged and partially engorged females was separately weighed and measured and placed in separate petri-dishes numbered consecutively from 1 to 12.

The state of engorgement of each tick was noted, as owing to the mule's condition it was condemned and killed, making it impossible to secure a sufficient number of females that were fully engorged, but of the twelve selected eight were fully engorged and would undoubtedly have very soon detached themselves if they had been left on the ear and the mule not been killed.

The ticks were observed and noted as being:

Tick No. 1—Fully engorged.
Tick No. 2—Fully engorged.
Tick No. 3—Partly engorged.
Tick No. 4—Fully engorged.
Tick No. 5—Fully engorged.
Tick No. 6—Fully engorged.
Tick No. 7—Nearly engorged.
Tick No. 8—Fully engorged.
Tick No. 9—Fully engorged.
Tick No. 10—Partly engorged.
Tick No. 11—Partly engorged.
Tick No. 12—Partly engorged.

The weights and measurements of the twelve females varied. The largest one, being fully engorged, weighed .2199 gram, and was 11 mm. in length, 8 mm. in width, and 5 mm. in height. The smallest being but partially engorged, weighed .0607 gram, was 7 mm. in length, 5 mm. in width, and 3 mm. in height. The combined weight of the twelve ticks was 1.2963 grams.

The weight and measurement of each tick was noted as follows:

	Weight	Length	Width	Height
Tick No. 1..	.2199 gram	11 mm.	8 mm.	5 mm.
" 2..	.1421 "	10 "	6 "	4 "
" 3..	.0458 "	8 "	5 "	3 "
" 4..	.1592 "	10 "	6 "	4 "
" 5..	.1467 "	10 "	7 "	4 "
" 6..	.1297 "	8 "	6 "	4 "
" 7..	.0757 "	8 "	5 "	3 "
" 8..	.0994 "	9 "	6 "	4 "
" 9..	.0832 "	8 "	6 "	4 "
" 10..	.0660 "	8 "	5 "	3 "
" 11..	.0679 "	9 "	5 "	3 "
" 12..	.0607 "	7 "	5 "	3 "

*Note.—The ears contained so many ticks and were such good specimens to show a severe infestation of *D. nitens* that upon the death of the mule one of the ears was removed and preserved and has now been sent to the Panama-Pacific Exposition at San Francisco.

The petri-dishes containing the ticks were kept on a slightly darkened shelf out of all direct sunlight.

The period of preoviposition was fairly short. The number of days elapsing from the time that the ticks were detached from the ear to the time that depositing of eggs began is given below:

Tick No.	1	2	3	4	5	6	7	8	9	10	11	12
Days	6	5	7	6	6	5	6	6	5	6	7	6

When oviposition began an actual count was made each morning of eggs deposited during the preceding twenty-four hours, by means of a hand lens and a blunt needle to separate the eggs. When counted they were then placed in a second petri-dish having a number corresponding with the number of the dish containing the parent tick. The daily removal of the eggs from the dish containing the tick to a separate dish avoided mistakes of counting the same eggs twice, and numbering the dishes prevented eggs of one tick being mistaken for those of another.

The largest number of eggs deposited by one tick in twenty-four hours was 434, and the smallest number was but 1. The largest number deposited by one tick during the entire period of oviposition was 2401, and the smallest number was 194. The total number of eggs deposited by all the ticks was 12,269.

The eggs deposited by Tick No. 3 were nearly all in bad shape at the time they were deposited, having the appearance of being shriveled and dried up. Some of the eggs of No. 5 were also in bad shape at time of deposition.

Twenty-five eggs were weighed within twelve hours of the time they were deposited and the results showed the average weight of each egg to be .000064 gram. As the total number of eggs deposited was 12,269 this gives the total weight of all eggs deposited to be .785216 gram.

The longest oviposition period of any of the twelve ticks was sixteen days, the shortest was eight days. The following table shows the number of eggs deposited daily by each tick:

June	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Tick No. 1..	....	154	434	395	326	301	240	202	119	91	60	33	19	13	14	....	....	= 2401
" 2..	70	256	300	309	189	92	62	81	18	10	14	4	2	5	....	....	....	= 1312
" 3..	....	....	12	65	31	13	17	15	8	6	2	18	3	4	...	....	.	= 194
" 4..	....	378	410	290	214	145	86	71	22	28	10	3	7	2	1	....	4	= 1666
" 5..	....	335	341	211	153	116	79	21	16	38	26	5	....	1	....	....	....	= 1342
" 6..	9	378	322	218	158	123	43	36	39	7	8	1	....	....	....	....	....	= 1337
" 7..	....	190	159	98	60	43	25	19	10	6	6	2	....	....	....	....	.. .	= 618
" 8..	....	291	253	156	152	49	72	23	14	10	5	2	2	2	....	....	....	= 1031
" 9..	14	301	187	110	178	55	29	10	13	6	8	4	2	1	....	....	....	= 918
" 10..	....	63	154	101	57	34	35	13	9	11	4	3	3	....	....	....	....	= 487
" 11..	....	....	162	112	54	27	22	15	1	8	....	....	....	. ..	....	....	....	= 401
" 12..	....	167	154	66	60	46	23	24	15	....	7	....	....	....	....	....	....	= 562
																		12,269

When oviposition was completed the petri-dishes were sealed with vaseline and placed in a fairly light part of the room but out of all direct sunlight.

The minimum and maximum daily temperatures were recorded. The lowest temperature at any time during the entire period of incubation was 71 degrees F., the highest was 94 degrees F. The average minimum temperature during the incubation was 74 degrees F., and the average highest was 89 degrees F.

The shortest incubation period was twenty-five days, counting from the time the first eggs of that batch was deposited until the first larvae emerged from the same lot of eggs.

The incubation period of eggs from each tick is shown:

Tick No. .	1	2	3	4	5	6	7	8	9	10	11	12
Days	27	27	27	25	27	27	26	26	26	25	25	25

After a number of larvae had emerged, it was impossible to keep accurate record of their emergence on account of young larvae, empty egg shells, and unhatched eggs all being massed together so closely that when they had apparently all emerged there may have been a few remaining eggs with unemerged larvae to escape notice, but as nearly as could be ascertained it required about five days for all the larvae to leave the eggs after emergence began.

The eggs had been placed in the centers of the dishes before sealing with vaseline and nearly all of the young larvae swarmed on the sides and under surface of the covers of the dishes

within a short time after they emerged and were easily removed.

After the larvae were removed from the dishes, the unhatched eggs were separated from the empty egg shells and the few larvae that had failed to swarm and remained in the egg heap by means of the hand lens and needle used in counting, and by making a count of the unhatched eggs the percentage of emergence was obtained.

The percentage of emergence of larvae from eggs of each tick is as follows:

Tick No.	1	2	3	4	5	6	7	8	9	10	11	12
Percentage emerged.	99	89	58	94	11	78	91	87	76	85	59	73

The average emergence was 75 per cent. The percentage of eggs from which larvae failed to emerge was high, but it must be taken into consideration that all the eggs were more or less handled during counting and undoubtedly many that did not hatch were spoiled by being bruised or punctured by the needle used in counting.

The foregoing observations were carried out in June, one of the months of the rainy season in Panama. The Monthly Meteorological Report of the Panama Canal gives the following conditions for the month of June at Ancon and is given here for its comparative value in case similar observations should be made during the dry season:

Mean Wet Ther. (deg. Fah.)	Mean Dew Point (deg. Fah.)	Mean Relative Humidity (per cent)	Mean Vapor Pressure (inches)	Evaporation Total (inches)
76	75	89	.862	3.280

Rainy Days	Clear Days	Partly Cloudy Days	Cloudy Days
21	1	11	18

REMARKS.

The accommodation of the tick to environment may be noted in the case of Nos. 3, 7, 10, 11 and 12. None of these was fully engorged. Under normal conditions they would have

remained on the host longer or until completely engorged. However, when taken from the host before complete engorgement, they showed no difference in the length of the preoviposition period but deposited their eggs on an average as early as those that were completely engorged when detached, but it is to be noted that they deposited a smaller number of eggs.

Another peculiar feature noted was the difference in the length of incubation period between the eggs deposited at the beginning of oviposition and those last deposited. Take for instance Tick No. 1 which began ovipositing on June 8th and continued until June 21st, covering a period of fourteen days. The eggs began hatching on July 5th and presumably they were all hatched by July 10th. If the eggs first deposited are the first to hatch they would cover an incubation period of twenty-seven days, while if the last deposited eggs were the last to hatch their period would be nineteen days, making a difference of eight days between the eggs first deposited and those of the last of oviposition. From this it appears that eggs first deposited require a longer period of incubation than those deposited later. I hope at a later date to be able to make more extended observations on this feature of the period of incubation.

Fragments on North American Insects—IX.

By A. A. Girault, Washington, D. C.

Nematus ribesii in Virginia (Hym.).

As noted above, larvae in various stages of development were to be found at Blacksburg on currants and gooseberries on May 13, 1902. From some of those kept indoors, adults were obtained on May 26, after about twelve days in the cocoon.

Nematus ventralis (Hym.).

Some larvae obtained from willow in the same locality June 28, 1902, cocooned on the following day and emerged between July 23 and 31, after from twenty-four to thirty-two days.

Callirhytis glandulosus in Virginia (Hym.).

Professor William B. Alwood was kind enough to bring to me from Cumberland Court House, Virginia, some branches of scrub oak on which were some very remarkable galls. They were within the acorns (July 30, 1901) and Professor Alwood told me that when he was examining them when on the trees, the small cases containing the larva

would grow out, so to speak, of the acorn and drop to the ground, "growing out" by means of fleshy stalks which would extend themselves and push the larval cases out. The dropping of the cases "made a continual patter," resembling that of rain on the foliage of trees in a forest. Upon examining the acorns, the teethlike larval cases were found to be arranged in a row at the base of the kernel of the acorn where they fitted into cavities; each one was upon a fleshy stalk; an acorn may contain from 4 to 6 of them. They are double, the inner case being pea-shaped and holding the larva. The larvae continued alive up to October 2, but died during the winter. The identification was through the kindness of Dr. L. O. Howard.

Callirhytis seminator (Harris) in Maryland and Virginia (Hym.).

By June 7, 1901, pupae were present in the galls of this species at Annapolis, emergence following about one week later. On June 16, the same year at Blacksburg, Virginia, adults were emerging, continuing up to July 3.

Syneches thyridopterygis (Riley) (Hym.).

This parasite was reared from the overwintered bags of *Thyridopteryx ephemeraeformis* Haworth at Annapolis, Maryland, June, 1901. The identification was by Ashmead.

Laelius trogodermatis Ashmead (Hym.).

In the original description of this species no mention is made of the carinae on the metathorax of which, in this species, there are 9, the five mesial ones complete, the two in the dorso-lateral aspect abbreviated caudad, not running quite half the length of the segment. The scutellar impression is crescentic. These notes from a single female identified by Ashmead.

The Trichogrammatid Genus Ophioneurus (Hym.).

For probable description of development of this genus, see Ganin, Zeitschr. f. Wiss. Zool., XIX, pp. 381-451.

Metamymar aleurodis Riley MS. and Pteratomus putnami Packard (Hym.).

The former mymarid has been overlooked. I do not know what it is nor whether it is described in the following reference: Fourth Rep. U. S. Ent. Commission, p. 107, note 29a. It is probably a *nomen nudum*. For figure of the rare *Pteratomus* see Amer. Naturalist, 1878, XII, pp. 445-448.

Polynema bifasciatipenne (Girault) (Hym.).

I find a reference under morphology of Mymaridae to Ayers on *Teleas* in Memoirs Boston Society of Natural History, III, 1884, pp. 261 ff. After *Teleas,* for some reason I had written "(= *Polynema bifasciatipenne?*)" Also I noted Ayers' references to Filippi and a marginal note referred to Packard's and Balfour's embryologies.

A Supposed Mymarid Parasite of Tabanid Eggs (Hym., Dip.)

From a mass of tabanid eggs obtained from the margin of a stream at Butler, Illinois, July, 1910, a mymarid near *Alaptus* issued but the specimen was lost. A number of *Phanarus tabanivorus* Ashmead also issued from the same mass. The mymarid probably came from the eggs.

Records of Parasites and Predators of Spider Eggs (Hym., Dip., Aran.).

I had collected the following references, which should be brought together, though not complete: *Acoloides emertonii* Howard (Bull. 45, U. S. Nat. Mus., pp. 171-172; Insect Life, II, p. 202); *Acoloides saitidis* Howard on *Saitis pulex* (Insect Life, IV, p. 124), on *Phydippus morsitans* (Proc. Ent. Soc. Washington, II, p. 300); *Acolus zabriskiei* Ashmead (Bull. 45, U. S. Nat. Mus., p. 175); *Aradophagus fasciatus* Ashm. on *Pityophthora querciperda* Swz. and *Brachyrhynchus granulatus* Say (De Dalla Torre, Cat. Hymenop., V, p. 512); *Baeus americana* Howard on Epeirids (Insect Life, II, pp. 270-271; Proc. Ent. Soc. Washington, II, p. 299); *Eupelmus piceus* Riley on *Argiope argentata* (Proc. Ent. Soc. Washington, II, 1892, p. 297); *Pimpla* spp. predaceous upon *Epeira angulata* and *Argiope riparia* (Proc. Ent. Soc. Washington, II, p. 294 et al.); *Pimpla inquisitor* on *Argiope riparia* (Insect Life, I, p. 324); *Pezomachus obesus* Brues from egg capsules of a spider (Bull. Wisc. Nat. Hist. Soc., VIII, p. 72); *Aphiochaeta epeirae* Brues on *Epeira* sp. (? eggs) (Aldrich, Cat. N. A. Diptera, 1905, p. 336); Cyrtidae on spiders (? eggs) (ib., p. 219); *Sarcophaga piceus* on *Argiope argentata* and *Phydippus opifex* (Insect Life, IV, p. 269). See also this journal, VII, 1896, p. 320; Proc. Ent. Soc. Washington, V, p. 308 and Insect Life, VI, pp. 259-260.

Insects Eaten by the Yellow-billed Cuckoo (Hem., Dip., Lep.).

A stomach of one of these birds killed on May 31, 1902, was roughly examined by Professor E. A. Smythe (Blacksburg, Virginia), who gave me the contents as follows (sex and age of bird not noted): 1 intact adult *Tibicen septendecim*, a partly digested adult tipulid and a finely divided mass of hairy caterpillars, probably those of *Malacosoma americana.*

The Birdbug Attacking Human Beings (Hem.).

Although it is known that the close allies of the common bedbug (*Cimex lectularius* Linnaeus) will feed upon human blood in confinement (it has been proved for *C. columbarius*), cases are certainly rarely made known where the parasites naturally attack human beings. The following extract from a letter received from Prof. Glenn W. Herrick in September, 1910, is unique, or if not so, still of great interest and impor-

tance. Professor Herrick wrote: "I am in receipt of two very interesting letters from a woman in Oriskany, New York, who is much worried regarding what she thinks are bedbugs. However, I have finally obtained specimens from her, and they are much smaller than the ordinary bedbug. Since the chimney in the house is full of swifts, and these bugs apparently invaded the room from an opening in the chimney, I take it for granted that they are a species parasitic upon the swift. Even if this be true, her letter is interesting from the fact that she maintains that these bugs have attacked voraciously the occupant of the bed in the room next to the chimney. She says, 'There is no doubt, I think, of their having bitten my sister not only two nights, but fresh bites having appeared during the second day, we examined her clothing and found them (the bugs) hidden there.' So far as I am aware, this is a new role for this particular bug."

Specimens which I received from Professor Herrick were most probably *Cimex hirundinis*, but I could not compare them with actual specimens of that species. The evidence is not complete, but the facts incline me to believe it more and more probable that the allies of *lectularius* will readily forsake their original or natural hosts when these latter are near to dwellings and attack human beings. A fowlhouse or a pigeon loft may thus become a center of infestation and the possibilities of disease transmission from animal to man so much augmented.

Tibicen septendecim (Linnaeus) in Montgomery County, Virginia (Hem.).

On June 21, 1901, and later, English sparrows were observed catching the adults of this species above a half dozen times, once or twice when the cicada was flying. I noticed the characteristic egg-slits in the following trees: White cedar (*Chamaecyparis sphracroidea;* trees apparently not injured); Wild cherry (*Prunus* sp.; small slits); European linden (*Tilia europaea;* wounds large and ruptured); White oak (*Quercus alba;* injury very noticeable); Red oak (*Quercus rufa;* injury noticeable); Apple (*Pyrus malus* vars.); Dogwood (*Cornus*); Hickory (*Carya* sp.); Black walnut (*Juglans nigra*); Lilac (*Syringa? vulgaris*); Persimmon (*Diospyros virginiana*); Peach (*Prunus persica*); Poplar (*Populus* sp.); Sycamore (*Platanus occidentalis;* small, subtriangular punctures); an unknown tree in forest of mountains;

Red cedar (*Juniperus virginiana;* no injury); Quince (*Pyrus cydonia;* not bad); Beech (*Fagus* sp.); native plum (*Prunus? umbellata;* not bad); Hawthorn (*Crataegus? flava*); Chestnut (*Castanea americana* var.; slight); Box Huckleberry (*Gaylussacia;* 3 bushes out of 35 examined); Acacia (*Robinia pseudacacia*); Hawthorn (*Crataegus? parvifolia*); Mountain Laurel (*Kalmia latifolia*); Willow (*Salix*); Blackberry (*Rubus villosus* etc.; on second year growth); Alder (? *Alnus* sp.); Raspberry (*Rubus strigosus* var.; on second year stems; also *R. occidentalis* var.); Blueberry (*Vaccinium virgatum;* old wood); Crab apple (*Pyrus baccata* var.); Maple (*Acer dasycarpum; A. saccharinum*); Birch (? *Betula* sp.); Sycamore maple (*Acer? pseudoplatanus*); Ash (*Fraxinus* sp.; large wounds) and Dewberry (*Rubus trivialis*).

Trees with herbaceous stems or with thick sap seem to be avoided by the mother cicada, as in the case of certain maples and the pines and spruces.

Additional Notes on Anasa tristis De Geer (Hem.).

At Blacksburg, Virginia, July 31, 1901, some squashes in a garden at the Virginia Experiment Station were found to be badly infested with this insect. The eggmasses contained from four to thirty eggs, but occasionally an isolated egg was found; they were on either surface of the leaf, usually the lower surface. In two masses which had hatched all the exit-holes were in the same end of both the eggs and the mass. On August 6 an adult locustid was observed eating the eggs of the bug; three eggs were eaten in succession. This fact had been formerly suspected. When first hatched the antennae, head and thorax are red, changing after two hours to black.

Duration of the Pupal Stage of Adalia 15-punctata (Col.).

A full grown larva of this species obtained from an apple tree at Blacksburg, Virginia, June 25, 1901, and fed in confinement upon aphids, attached itself to a leaf by the end of its abdomen at about 2 p. m., June 28, pupated about 8 a. m., June 30, and emerged as an adult about eight o'clock July 4 following. When disturbed, the pupa erected itself violently, no doubt a reaction against parasitism.

Leptinotarsa 10-lineata (Say) (Col.).

I noticed a pair of these beetles apparently mating on August 19, 1901, at Annapolis, Maryland; larvae were then numerous on potatoes.

A Predaceous Enemy of Macrodactylus subspinosus (Col.).

At Blacksburg, Virginia, June 27, 1901, I observed an adult Asilid with an adult of this beetle impaled on its beak. On June 16, *subspinosus* was noted as having been very injurious to some cultivated cherries; the foliage was simply riddled with small irregular holes, while the fruit was badly eaten into, leaving little islands of the outer surface standing here and there over the circumference.

Wandering Larvae of Pyrrharctia isabella (Lep.).

On October 31, 1901, at Blacksburg, Virginia, the larvae of this species were common, wandering about over the ground as is their habit before winter arrives; one was observed as late as December 7, while on December 28, 1901, at Annapolis, Maryland, again a few were observed. On the 18th of January, 1902, at Blacksburg, a hibernating larva was found while in April 6 following, in the same locality, a full-grown larva was found. In the Maryland locality, wandering was observed as early as September 13 (1901).

Carpocapsa pomonella Linnaeus (Lep.).

The adults of this species were emerging at Annapolis, Maryland, in 1901, about May 11, from overwintered pupae.

Harrisina americana, the American Procris (Lep.).

A colony of the larvae of this species obtained from a correspondent in Virginia by Professor William B. Alwood pupated at Blacksburg on July 22 (average), the moths emerging on August 3 following. The larvae were on cultivated grape. At Annapolis, Maryland, the same year, a colony about half grown were taken from grape on September 3 (1901).

The Method of "Worming" for the Peach Borer Sanninoidea exitiosa Say (Lep.).

While engaged in studying this insect for the national Bureau of Entomology in Georgia in 1906, I observed a variety of methods in practice for the purpose of removing the larvae from the trees, but they all seemed to me to be doing more harm than necessary to the trees, at the same time not proving very efficient. I remember distinctly following several different gangs engaged in the operation and obtaining from the treated trees nearly as many of the caterpillars as would be obtained from a like number of untreated trees at the same place. Many of the trees, moreover, had been badly wounded without, it appeared, the compensating destruction of the larvae. Whether the Bureau has a note to the effect or not I am uncertain, so that while thinking of it take this opportunity of recording my mental impression of the correct procedure without, I hope, seeming to infringe upon the rights of the Department of Agriculture. By trial, I have repeatedly satisfied myself that locating the larva and removing it is a comparatively simple matter and one to be learned easily from experience by any close observer and that it would be economical for large orchardists to employ one unusually bright workman for this purpose alone throughout the whole year rather than as is done now to have gangs of a half dozen or more stupid ones, employed irregularly and when working chiefly occupied in half-girdling the trees and killing earthworms. To locate a larva but one cut of the knife is necessary and this cut should also kill it. The correct method is rapid, sure and

safe, and until we know to the contrary the only practice worth while in connection with this insect. A good, strong jack-knife is the only tool required, several inches of the surrounding soil having been removed previously.

Another Note on Hyphantria cunea Drury (Lep.).

On July 4, 1901, at Blacksburg, Virginia, I obtained a large nest of this species from Pear, the larvae averaging about 5 mm. in length. They were fed in confinement and pupated on August 2. They were not observed further. On August 19, at Annapolis, Maryland, the larvae were abundant in various stages of growth and a month later it was noted that all had pupated for the winter. They were very abundant in that part of Maryland in 1901. On August 29 a note was made to the effect that the caterpillars were very annoying in the town of Annapolis, crawling over houses, on to people and so on. Larvae were still in numbers September 13.

Dryocampa rubicunda (Lep.).

July 5, 1901, I obtained some of the caterpillars of this moth from a sugar maple on the campus of the Virginia Polytechnic Institute at Blacksburg, Virginia. The tree was badly infested by them. Ten of the larvae were confined and fed, entering the earth for pupation on July 5 (average) and emerging on July 28 to 30. The few eggs obtained were yellow, flattened, globular from above, glabrous, with a diameter of about 1.25 mm.

A Butterfly Which is Confined to Isolated Areas of Small Size (Lep.).

Some years ago in Virginia I used to accompany Mr. Hermann J. Erb, of New York City, on some of his collecting trips into the mountains of southwest Virginia. One of the most interesting of these (to me then) and most fascinating of adventures into wonderland was a trip to a little valley at the base of what is called Roanoke Mountain near Blacksburg.* Here there seemed to be a "metropolis" for that beautiful and interesting species of butterfly, *Papilio ajax*. In this little depression they could be found in large numbers at certain times of the year (mid July for one), while in the surrounding country, only an occasional individual would be encountered, probably a stray from the colony. I made no note tending toward an explanation.

Collecting Moths of the Noctuid Genus Catocala (Lep.).

During a number of trips with the same collector some of the most interesting were in pursuit of those splendid bark-mimicking moths of the genus *Catocola*. Armed with stout sticks, an unfrequented mountain forest was usually entered and separating, the collectors went from tree to tree, scraping their sticks lightly up and down the trunks. This effectually frightened any moths resting upon the bark and when this happened, the specimen was watched until it alighted again, upon

which a wide-mouthed cyanide bottle was placed over it. The sticks were moved gently along the trunks so as not to hit the moths. In frequented forests, where cattle ran for instance, these moths appeared to be absent or else scarce, due no doubt to their being continually disturbed. Occasionally some specimen, when flushed, would alight far up, so that it would have to be climbed for. Mid-day is the best time to collect, since the higher the sun climbs the lower the moths descend on the tree trunks. Oaks and hickories were what might be called the favorite trees. This was in July.

Protoparce celeus and carolina (Lep.).

While in a tobacco field near Annapolis, Maryland, August 30, 1901, I noticed that both of these species were present in large numbers, and in all stages of development. Of a large number of eggs found the majority were on the under surface of the leaves, but from one portion of the field as many as twenty-six eggs were noticed upon the upper surface. On September 19, in the same field, larvae in all stages were still present in seed fields, but no eggs could be found.

Desmia maculalis Westwood (Lep.).

This species was found abundant at West Annapolis, Maryland, September 3, 1901, on cultivated grape. Sometimes two or three of the caterpillars were found on one leaf. By September 12 all the caterpillars kept in confinement had pupated, but no adults emerged subsequently.

Empretia stimulea Clem. (Lep.).

The local papers at Annapolis, Maryland, in August, 1901, printed one or two sensational articles concerning this insect, which was reported to be annoyingly abundant and causing many cases of blood poisoning. At the time I happened to find a larva on rose in a garden, but could find no others and have never seen them at all abundant. Their armature, however, can sting very severely. At Mossman, North Queensland, some months ago, I accidentally pressed my finger on a very similar larva (evidently of the same family) and received a severe shock. No ill effects, however, followed. The pain caused is severe and sudden. I have seen the larvae of *stimulea* on plum at Washington, D. C. Its sting is quite as severe as that of the tropical insect.

Larva of Heliothis obsoleta Fabricius Eats a Larva of Empretia (Lep.).

On September 10, 1901, I obtained at Annapolis, Maryland, a full-grown caterpillar of *Heliothis obsoleta* from the ear of a corn plant. It was kept temporarily in one of those light wooden boxes used for safety-matches of Swedish manufacture. On the morning of the twentieth I saw that the larva had escaped through a hole cut through the top of the box and after some searching I gave it up for lost. However, upon opening a nearby box of white pine, covered on two

sides with gauze and in which was being kept a larva of *Empretia stimulea,* I was surprised to find the *obsoleta* larva within, engaged in feeding upon the *Empretia,* its head buried into the back of the latter. It was removed and placed under a beaker on a sheet of white paper. After trying to escape for some time, it finally successfully pupated. The *Heliothis* larva had not been fed since its time of capture and was thus driven to its meal of flesh by hunger.

Hemerocampa leucostigma Smith and Abbott in Maryland (Lep.).

The shade trees along the streets of Annapolis were badly infested by this insect in 1901 (August and September). Cocooning of the larvae of the last generation commenced about August 30, continuing for about ten days. (On September 22 larvae were still crawling about). The cocoons were conspicuous in many places on houses and buildings, the under side of clapboards and window sills, along rain spouts, the under sides of ledges and so on being lined with them. The State House along the lower stories was full. The under surface of leaves, loose bark and other places on trees also afforded shelter for many. The wandering full-grown larvae caused some annoyance. By September 8 several females had emerged and on the 16th a male was noticed. On September 22 a female was observed resting upon her recently deposited eggmass and on the following day it was noted that they were present in numbers and eggmasses were becoming more abundant. On September 25, at Blacksburg, Virginia, it was noted that the male moths were plentiful at lights.

Philampelus achemon Drury (Lep.).

A full-grown larva of this species taken from grape at Annapolis, Maryland, September 7, 1901, pupated in confinement, the pupa passing the winter.

Icthyura palla French in Maryland (Lep.).

On the seventeenth of September, 1901, I found on a willow at West Annapolis, Maryland, a number of bunches of leaves fastened together by silken threads and also lined with a mat of silk, each bunch forming a nest which contained the caterpillars of this species in various stages of growth. In one nest seventeen larvae were found, ranging from 1.25 to 2.5 cm. On September 22 a few of the larvae pupated in confinement. Six days later at Blacksburg, Virginia, full-grown larvae were observed and also on October 6; younger stages were also present. On October 14, larvae in confinement were again pupating while out-of-doors; most of the nests appeared to be deserted, though some larvae were observed feeding openly on foliage; yet most of them had crawled to the ground and formed their cocoons. This was done since September 22, gradually as each stage came to full growth. In Virginia larvae of this species have been observed feeding upon white oak.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., MAY, 1915.

The International Entomological Congress.

It may be remembered that the third meeting of the International Entomological Congress is scheduled to be held in Vienna, Austria, from the 5th to the 12th of September of the present year. Even if the European war should come to an end before that time it would probably not be expedient under the circumstances to hold the meeting. So far as we are aware the Executive Committee of the congress has not taken any action in relation to postponement. The entomologists of the Western Hemisphere are more vitally concerned regarding the time and place of meeting, as they must travel a long distance, at considerable expense, and make preparation in advance. The entomologists in Europe, being so much nearer the place of meeting, do not have the same difficulties. It is not an easy problem to decide on the best mode of action. The Executive Committee could postpone the meeting indefinitely and then be guided by circumstances in deciding when and where it should be held, or it might be advisable to be more specific and decide to hold the meeting in a town like Geneva or Lucerne, in Switzerland, in 1916. The members of the Executive Committee should consult the interests of entomology solely in this matter and all national, racial and linguistic considerations be relegated to the background. The Pacific Coast meeting of the American Association for the Advancement of Science and also that of the Entomological Society of America, coincident with the Panama Pacific Exposition this summer, will probably take all our entomologists to California, and no one from this side of the Atlantic would be likely to go to Vienna, even if the war should terminate suddenly. The first two meetings of the congress were very successful and it is to be hoped that the third meeting may also be a success and that it may be managed in such a way that the war will not interfere—H. S.

The Executive Committee of the International Congress of Entomology considers it advisable to postpone the Third Congress, which was to be held at Vienna this year. It is to be hoped that the deplorable state of affairs in Europe will have no serious ill effect on the future international relations between entomologists. A Congress held under the present circumstances might tend to separate rather than to unite. This information was received after the above was written. —H. S.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

1—Proceedings of the Academy of Natural Sciences of Philadelphia. **3**—The American Naturalist. **4**—The Canadian Entomologist. **5**—Psyche. **7**—Bureau of Entomology, U. S. Department of Agriculture, Washington. **8**—The Entomologist's Monthly Magazine, London. **11**—Annals and Magazine of Natural History, London. **13**—Comptes Rendus, Societe de Biologie, Paris. **18**—Ottawa Naturalist. **21**—The Entomologist's Record, London. **36**—Transactions, Entomological Society of London. **37**—Le Naturaliste Canadien, Quebec. **40**—Societas Entomologica, Zurich. **45**—Deutsche Entomologische Zeitschrift. **50**—Proceedings, U. S. National Museum. **66**—Die Naturwissenschaften, Berlin. **67**—Entomologiske Tidskrift, Stockholm. **68**—Science, New York. **81**—Biologisches Centralblatt, Erlangen. **84**—Entomologische Rundschau. **97**—Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **102**—Proceedings of the Entomological Society of Washington. **107**—Revista, Museu Paulista, Saõ Paulo, Brazil. **123**—Bulletin of the Wisconsin Natural History Society, Milwaukee. **153**—Bulletin of the American Museum of Natural History, New York. **161**—Proceedings, Biological Society of Washington. **166**—Internationale Entomologische Zeitschrift, Guben. **177**—Quarterly Journal of Microscopical Science, London. **179**—Journal of Economic Entomology. **207**—Anales, Academia de Ciencias Medicas, Fisicas y Naturales de la Habana, Revista Cientifica. **216**—Entomologische Zeitschrift, Frankfurt a. Main. **223**—Broteria, Revista de Sciencias Naturaes do Collegio de S. Fiel. (Ser. Zoologica). **242**—Transactions, Royal Society of Canada, 3d Series, Ottawa. **322**—Journal of Morphology, Philadelphia. **344**—U. S. Department of Agriculture, Washington, D. C. **361**—Atti della Societa Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano, Pavia. **411**—Bulletin, Brooklyn Entomological Society. **420**—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington.

447—Journal of Agricultural Research, Washington. **456**—Kosmos, Handweiser fur Naturfreunde, Stuttgart. **502**—American Museum of Natural History, New York. **503**—Boletin, Sociedad Physis, Buenos Aires.

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HEMIPTERA. **Cockerell & Robinson**—Description and records of Coccidae [1 new], **153**, xxxiv, 105-113. **Gillette & Bragg**—Notes on some Colorado Aphids having alternate food habits, **179**, viii, 97-103. **de la Torre Bueno, J. R.**—Note on the Harris collection of Heteroptera, **5**, xxii, 16-17. **Turner & Baker**—On the occurrence of an intermediate in Aphis pomi, **102**, xvii, 42-51. **Woodworth, C. W.**—The rate of hatch of scale insect eggs, **4**, 1915, 98-9.

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KEY TO THE FAMILIES OF NORTH AMERICAN INSECTS. An Introduction to the Classification of Insects. By CHARLES T. BRUES, Assistant Professor of Economic Entomology, Harvard University, and A. L. MELANDER, Professor of Entomology, State College of Washington. Boston, Mass., and Pullman, Wash. Published by the Authors, 1915. Pp. vii, 140. 18 plates of line figures. $1.50 postpaid.

"The present manual attempts to bring together a brief yet complete key to the families of American insects, unhampered by more than the explanations needed to make such a tabulation available to the general student....Identification of the families has been effected by means of analytical keys, which have been arranged as dichotomies ......While the dichotomies frequently represent the natural relationships or the lines of phyletic development, no attempt has been made to preserve natural divisions wherever the convenience and practical operations of the keys would have been sacrificed...... The task of the writers has been little more than to compile from [the] existing

literature the most recent ideas, and they have gleaned from...many sources in various languages." (Preface).

Perhaps the first thing to strike the reader on looking over this volume is that for the first time, we believe, in an American text-book, the newer classifications are employed. Thus "the unified ordinal groups essentially as limited by Handlirsch" are adopted, and the "Conspectus of the Higher Groups of Insects" on page 1 begins with "Class Pterygogenea, Subclass Orthopteroidea" under which, as orders, are the Grylloblattoidea, Orthoptera [*i. e.* Saltatoria only], Phasmoidea, Diploglossata, Dermaptera and Thysanoptera. Then follows the Subclass Blattaeformia and so on. The Hymenoptera are divided into the Chalastogastra and Clistogastra, the primary subdivisions of the latter being the Ichneumoniformia, Vespiformia, Spheciformia and Anthophila. In the Coleoptera the results of the labors of Lameere, Ganglbauer, Kolbe and Gahan are seen in the recognition of the two suborders, Adephaga and Polyphaga, with fifteen groupings of the families of the latter. The subclass Panorpoidea embraces the orders Panorpatae, Trichoptera, Lepidoptera, Diptera and Suctoria. Curiously enough, the Thysanura, Campodeoidea, Collembola and Mirientomata (each of which, as with Handlirsch, ranks as a class, hence coequal to the Pterygogenea) are at the end of the Conspectus, after all the highly specialized groups.

The key to the 37 Orders occupies pp. 6-12. The keys to the families fill pp. 13-83. There are 427 outline figures on the 18 plates which give one an idea of the appearance of the representatives of many families or of parts of the body used in classification. Those on Plate 17 are of immature stages, those on Plate 18 of terrestrial Arthropods not insects. The figures are chiefly redrawings by Mrs. Brues.

There is a Glossary of Special Terms, pp. 121-127, and an Index to Genera and Higher Groups, pp. 128-140.

Whether we use the newer classifications or not (and the reviewer has been employing many of them in his University classes), a valuable feature of this book is that it will introduce them to many American students to whom they seem to be more or less unknown. P. P. C. (*Advertisement*).

HANDBOOK OF MEDICAL ENTOMOLOGY. WM. A. RILEY, PH.D., Professor of Insect Morphology and Parasitology, Cornell University, and O. A. JOHANNSEN, Ph.D., Professor of Biology, Cornell University. Ithaca, New York. The Comstock Publishing Company, 1915. Pp. ix, 348. 174 figs. Postpaid $2.20.

This "Handbook of Medical Entomology is the outgrowth of a course of lectures along the lines of insect transmission and dissemination of diseases of man given by the senior author in the Department

of Entomology of Cornell University during the past six years. More specifically it is an illustrated revision and elaboration of his 'Notes on the Relation of Insects to Disease,' published January, 1912." It is an excellent summary of present information on the subject, viewed from the human side.

The book is not, of course, limited to the insects, as one might infer from the first paragraph of the Preface just quoted, but includes the Arachnida, Myriopoda and, in one instance at least, the Crustacea also. In the titles of the chapters, "Arthropods" is the group name most frequently employed. After a brief Introduction (I) on the "Early suggestions regarding the transmission of disease by insects" and "The ways in which Arthropods may affect the health of man," there are chapters on Arthropods which are directly poisonous (II), Parasitic Arthropods affecting man (III), Accidental or Facultative Parasites (IV), Arthropods as simple carriers of disease (V), as Direct inoculators of disease germs (VI), as Essential hosts of pathogenic organisms (VII), as Essential hosts of pathogenic Protozoa (3 chapters, VIII-X), and on Some possible but imperfectly known cases of Arthropod transmission of disease (XI). The treatment of the subject is, therefore, ecological rather than entomological, and the title of the book seems to us misleading, as a "Handbook of Medical Entomology" leads one to expect primarily a consideration of the Arthropods producing certain effects than of the effects due to Arthropods. While the order followed may be useful in a purely didactic course of lectures, we do not find it well adapted to a laboratory course of instruction.

The effects of mosquitoes are considered in four different places, under chapters II, III, VII and VIII, those of ticks in chapters II, III, IX and X. Any one who wishes to use this book to learn what are all the effects upon human beings produced by any one group of Arthropods must have recourse to the Index and this we have found incomplete. Thus, to the entries for "mosquitoes" should be added pages 186 and 291, to those for "ticks" pages 62, 221 and 230, mentioning only the lacking references to the first pages of sections or chapters concerned, without attempting to supply a reference to every page on which the word "mosquito" or "tick" happens to occur.

The title of the book naturally suggests that of another, recently published in English: Patton & Cragg's "Textbook of Medical Entomology," noticed in the News for July, 1914, pages 333-334. In the latter volume the arrangement is entomological throughout, the various results due to the interaction of Arthropods and Man being discussed in connection with each taxonomic group.

Riley and Johannsen's Handbook is a much smaller book than that of their Anglo-Indian predecessors, as the American authors give no, or very brief, descriptions of the structure of the Arthropods with which they are concerned, assuming, no doubt, that those who will

use their book have already acquired such information. Patton and Cragg, on the contrary, give very full accounts of the anatomy and physiology.

The twelfth chapter of Riley and Johannsen consists of Keys to the Arthropods noxious to Man. There is an up-to-date bibliography of 14 pages arranged alphabetically under authors' names, and the 8 page index. P. P. C. (*Advertisement.*)

Doings of Societies.

English and German Entomological Societies and the War.

At its meeting of November 4, 1914, the Entomological Society of London adopted the "Reply to the Declaration of German Professors" in regard to the present war which was published in the London *Times* of October 21. The "Declaration" and the "Reply" are reproduced in full in the *Proceedings* of the Society for 1914, pp. xc.-xciv. Prof. Auguste Lameere, of Brussels, was elected on December 2, 1914, to the Honorary Fellowship vacant by the resignation and subsequent death of Dr. August Weismann.

The Deutsche Entomologische Gesellschaft of Berlin, at its meeting of September 7, 1914, unanimously adopted the following resolutions: 1. During the war only one official meeting will be held on the first Monday of each month, the others are not compulsory. 2. The Society assigns paper to the nominal value of 500 marks to the Red Cross and to the National Fund for the families of those fallen in the war. Herr Blume, Jr., member, was wounded at Ypres; Herren Ahlwarth and Speiser are in the field.

Chicago Entomological Club.

Meeting of January 17, 1915, at the home of Charles Selinger, eleven members attending.

Considering the likelihood that a number of entomological enthusiasts would stop over at Chicago on their way to the Panama Exposition, it was suggested that it would be desirable to serve such visitors to the best of our ability and enable them to meet those similarly interested. It was therefore decided to invite all prospective visitors to correspond with the secretary and advise him of their plans, so that suitable arrangements can be made. The secretary was further authorized to call upon the members of the club for any necessary assistance.

As an attraction entomologically, Chicago has the Strecker collection of Lepidoptera, which is at the Field Museum of Natural History, besides several large private collections of Lepidoptera and Coleoptera, one of Hemiptera and several general collections.

Lepidoptera.—Lepidopterists had as a subject the genus *Hadena,* which was informally discussed. Local captures in this genus

were reported as follows: *Hadena stipata* rare, *passer* not rare at light, *suffusca* 1 at light, *apamiformis* rare, *dubitans* common, *plutonia* several under logs, *devastatrix* common, *arctica* common, *cuculliformis* rare, *verbascoides* rare, *cariosa* not common, *lignicolor* common, *mactata* rare, *modica* common, *miscelloides* 1 at sugar, *fractilinea* not rare, *semicana* not rare, *misera* rare, *jocasta* rare, *diversicolor* bred from *Carex* sp., *chlorostigma* rare.

Meeting of February 21st, at the home of J. H. Reading, fourteen members present.

Lepidoptera.—Mr. Reading has a large collection of both exotic and domestic Lepidoptera which proved very entertaining. Lepidopterists brought their specimens of the red underwing group of the *Catocalae* and particular attention was given to these. Local captures were reported as follows: *Catocala ultronia, coccinata, cerogama, ilia,* var. *uxor,* var. *osculata, marmorata, parta, unijuga, meskei, briseis, cara, amatrix,* var. *nurus, concumbens.*

Coleoptera.—Coleopterists had the Buprestidae as a subject and noted the following captures as being of special interest:

Dicerca asperata Lap. and Gory, at Edgebrook and Ft. Sheridan, on oak.
Dicerca caudata Lec., at Riverside, Illinois.
Poecilonota thureura Say, at Millers, Indiana, on poplar.
Buprestis obscura Casey, at Millers, Indiana, and Pine, Indiana, on pine.
Buprestis confluens Casey, at Millers, Indiana, on pine.
Buprestis striata Fab., at East Gary, on pine.
Agrilus crataegi Frost, at Edgebrook, on pine.
Agrilus crinicornis Horn, at Ft. Sheridan to Willow Springs.
Agrilus obliquus Lec., at Bowmanville.
Chrysobothris azurea Lec., at Edgebrook, on *Crataegus.*

A total of 55 species of Buprestidae have thus far been identified and reported from the Chicago area.

After the usual refreshments, always welcome to bugologists, the meeting adjourned.

ALEX. KWIAT, *Secretary,* 2055 Pensacola Ave., Chicago, Ill.

Feldman Collecting Social.

Meeting of February 17, 1915, at the home of H. W. Wenzel, 5614 Stewart St., Philadelphia. Thirteen members present, Pres. H. A. Wenzel in the chair.

Dr. Skinner mentioned several species of various orders in which 20 and 30 years intervened between captures; said he believed if one knew the habits of these insects they would easily be caught and no species would be rare.

Lepidoptera.—Mr. Haimbach exhibited a box of Heterocera containing the following species: *Phragmatobia fuliginosa* Linn., *Ec-*

pantheria deflorata, Fabr., *Halisidota caryae* Harr., *Apatela funeralis* Grote, *Metathorasa monetifera* Gn., *Hypsorophia hormos* Hübner, *Plusiodonta compressipalpis* Gn., *Tarache delecta* Walk., *Euthisanotia grata* Fabr., *Phiprosopus callitrichoides* Grote, *Achatodes zeae* Harr., *Remigia repanda* Fabr., *Lophodonta angulosa* S. & A., *Schizura badia* Pack., *Fentonia marthesia* Cram., *Ianassa lignicolor* Walk., *Tolype vellida* Stoll, *Tolype laricis* Fitch, *Datana perspicua* G. & R. and *Harpyia borealis* Bov. With the exception of *Tarache delecta* the specimens exhibited were all taken at upper Roxborough, Philadelphia, and all these and many other pretty species have been comparatively common on and about his place. The specimens of *Tarache delecta* he caught at Cape May Point, New Jersey, in the cat tail swamps on July 26, 1914. The speaker also reported the capture of one specimen of *Melipotis nigrescens* G. & R. on July 3, 1914, at Roxborough. He said he took a pair of this species in Fairmount Park, Philadelphia, about twenty years ago. (Texas and Calif.—Dyar's List.)

Coleoptera.—Mr. Kaeber exhibited a species of *Ptinus* which he had bred from English walnuts January 26, 1915, and a specimen of *Zenoa picea* Beauv. collected at Red Bank, New Jersey, July 4, 1908, which latter is not in the New Jersey List.

Adjourned to the annex.

GEO. M. GREENE, *Secretary*.

American Entomological Society.

Meeting of February 25, 1915. Dr. Calvert, President, in the chair; nine persons present, including Messrs. W. T. Davis and P. W. Whiting, visitors.

Mr. Davis stated that some celluloid or gelatine points on which insects had been mounted had been injured by acetic ether used to kill *Anthrenus*.

Odonata.— Mr. Davis exhibited a male of *Gomphus abbreviatus* Hagen, collected at Greenwood Lake, New Jersey, June 18, 1911, by F. M. Schott, and an addition to the dragonflies of New Jersey. Mr. Greene, while at Dreer's nurseries, Riverton, New Jersey, on the 14th inst., had visited the house where aquatic plants are grown and saw a number of dragonflies flying around. Dr. Calvert remarked that in the Bulletin of the Brooklyn Ent. Soc. VIII, pp. 93-96, Oct., 1913, Mr. W. T. Davis had established the genus *Williamsonia* for *Cordulia lintneri* Hagen. The recorded localities for this dragonfly are Center, near Albany, New York (types), Saskatchewan, Lake Winnepeg, and Paterson, New Jersey. The speaker now wished to record the occurrence of this species in Massachusetts, based on three specimens which he had examined during the past three years, viz., a female from Dedham, May 20, by Mr. C. W. Johnson (now in the collection of the Boston Society of Natural History) and a male and female from Concord, May 16, 1908, sent from the Thoreau Museum of the Middlesex School in Concord for identification. These latter two had been much

damaged in transit, and the female, now in the collection at the Academy of Natural Sciences of Philadelphia was exhibited.*

Orthoptera.—Mr. P. W. Whiting described experiments performed upon *Chortophaga viridifasciata.* This grasshopper, as is well known, occurs in two color phases, green and brown. The males are almost exclusively of the brown phase, green males being very scarce. Females occur in both phases quite commonly. Experiments were performed at the Bussey Institution of Harvard University by mating brown with brown and green with green, also by cross-matings. This produced all brown individuals irrespective of the parentage. The conditions under which the young were reared were hot and dry. Later the environmental conditions were tested, and it was found that dampness produced green individuals. In a few cases brown individuals were shifted to green after an ekdysis. Green individuals always shifted to brown when conditions were hot and dry. At the University of Pennsylvania the conditions have been better controlled by means of constant temperature rooms, and here it is found that coolness and dampness produce green individuals, while heat and aridity produce brown individuals. The lighter browns apparently are a step in the direction of the green since dark brown individuals become lighter before they turn green. The work of Dr. Nabours shows that pattern is hereditary. His experiments were performed upon *Paratettix texanus. Nomotettix* apparently has the same color patterns as *Paratettix texanus.* It is intended to investigate these shortly. Mr. Rehn said work in the field corroborated Mr. Whiting's experimental studies.

Lepidoptera.—Mr. Laurent exhibited a series of specimens of *Hyphantria cunea* (the fall web-worm moth) in which the maculation of no two specimens was alike. Specimen No. 1 was pure white without a spot, while in specimen 16, the maculations were so numerous that they gave the anterior wings a blackish appearance. In the majority of the moths the posterior wings were immaculate, only a few showing any maculations. The speaker stated that the caterpillars did not always remain in the first web, increasing the size of the web until the caterpillars became full grown, but that often part of them left the first web-like nest and spun a new one some distance from the old one. From one-fourth to one-half of the caterpillars often deserted the old web. Mr. Williams exhibited mounts of the genitalia of *Eumaeus atala.* He said he had found a retractile brush between the genitalia and the last abdominal segment. This brush is apparently made up of modified scales. It is a male secondary sexual character.

HENRY SKINNER, *Secretary.*

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* This record has also been published by Mr. E. L. Pierson, Proceedings of the Thoreau Museum of Natural History, Middlesex School, Concord, Mass., Vol. I, p. 41, Feb. 28, 1915.—ED.

OBITUARY.

FERDINAND KOWARZ, born in Plan, Bohemia, February 23, 1838, died at Franzensbad, September 22, 1914. From 1859 to 1901 he was in the Austrian telegraphic and postal service. Dr. Th. Becker, who contributes an obituary sketch of him to the *Deutsche Entomologische Zeitschrift* for 1915, Heft I, accompanied by a list of his 19 papers on the Diptera between 1867 and 1893, considers that his services to Dipterology consist in the enlargement of our knowledge of genera and species of the European fauna, partly by new descriptions, partly by systematic studies, in which he made large use of chaetotaxy. He received his first impulse to the study of these insects from Schiner with whom, and later with H. Loew and Mik, he remained in lifelong friendly relations.

A biographical notice, in Swedish, of Dr. FILIP TRYBOM, accompanied by a portrait, is contained in the *Entomologisk Tidskrift* Arg. 35, Häft 1-2, Uppsala, 1914, recently received. Doctor Trybom was born December 24, 1850, and died February 15, 1913. A bibliography of 27 titles appended to the notice includes articles on Diptera, Odonata and Physapoda, on which last group most of his entomological work was done.

[From the *Deutsche Entomologische Zeitschrift* for 1914 Heft VI and 1915, Heft I, and *Entomologische Blätter*, XI, Heft 1-3, 1915, we learn of the deaths of the following entomologists in the war:]

Dr. WALTER STENDELL, born August 25, 1889, author of *Beiträge zur Kenntniss der Oenocyten von Ephestia kuehniella* Zeller, at Léchauld, September 28, 1914.

Dr. OTTO KIRCHHOFFER, born July 2, 1863, author of *Untersuchungen über die Augen pentamer Käfer* and of *Die Entwicklung der Complexaugen nebst Ganglion opticum bei Dermestes vulpinus.* [Date of death not given.]

Oberleutnant v. ROTHKIRCH UND PANTHEN, an active Coleopterist, was killed on the borders of Kamerun.

Dr. W. HAAS, assistant in the Institut für Binnenfischerei in Friedrichshagen.

Dr. F. VOGEL, worker in the Landesanstalt für Gewässerkunde in Berlin.


Johannes Gundlach

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Juan Gundlach.

By CHARLES T. RAMSDEN, Guantanamo, Cuba.

(Plates VIII and IX.)

Johannes Christopher Gundlach was born on July 17th, 1810, at Marburg, Hesse-Cassel (now Hesse-Nassau), Germany. His father, Johann, a Professor of Mathematics and Physics at the University of Marburg, died, leaving a widow, Christina Redberg, and five children to live on two small pensions, one from the State, and the other from the University, not sufficient to make ends meet and educate the children.

It was from his eldest brother, just returned from Cassel, where he had mastered the art of taxidermy, that Johannes then nine years old, got his first notions in this line; though he had long been fond of studying nature in all its forms, so fond indeed that his spare moments were dedicated entirely to it. On one occasion while collecting birds, being about to shoot one, seeing a guard coming up, Gundlach got so nervous while trying to hide his gun under his coat, muzzle up, the hammer getting fouled in his clothing, the cartridge exploded,

injuring his nose and palate to such an extent that he completely lost all sense of smell and taste. I remember his saying, one day at home, that he had no taste, all things were alike to him, so he ate only to satisfy hunger.

His mother being anxious that he should study for the ministry, he began, but fortunately for science, Dr. Maurice Herold, Professor of Zoology at the University, at the same time offered him the position of Conservator of the University Museum, a chance that was eagerly seized by the young naturalist, who gave up the idea of becoming a Minister of the Gospel, not before obtaining permission from his mother to do so, however. He at once began the course of Zoölogy at the University, where, due to his being the son of one of its Professors, he obtained free tuition, graduating in the fall of 1837 with the degree of Master of Arts, and obtaining that of Doctor of Philosophy the following year.

His ambition was not satisfied with work at the Museum. The wilds appealed strongly to him, so when invited to Surinam, Dutch Guiana, by his friend, Dr. Jules Hille, a Dutch military doctor, who offered him lodging and other help, his joy was unbounded. Communicating his enthusiasm to others, there was formed an organization to furnish funds by the sale of stock to be repaid by Gundlach with specimens collected on the trip. In the meantime he spent half a year studying the Zoölogical Museum at Frankfort-on-Main.

Fortunately for Cuba, about this time Mr. Charles Booth, of Matanzas, Cuba, having finished his studies in Europe, invited Dr. Louis Pfeiffer, afterwards famous for his work on shells, notably his Monographia Helicorum, Pneumonopomorum et Auriculaceorum Viventium; Edouard Otto, son of the Director of the Botanical Gardens at Berlin, and Johann Gundlach, to spend some time with him in Cuba. Gundlach accepted at once with the other two, but with the idea of continuing from Cuba to Surinam. So in November, 1838, they set sail on the brig "Augustus and Julius," arriving on Christmas Day of the same year at Cape Maisi, the easternmost end of Cuba, where contrary winds obliged them to take the course around the southern, or at this season lee side of the Island,

sighting Cape San Antonio on the western end on New Year's Day, making Havana harbor on the evening of the 4th of January, 1839, but not landing till the next morning. They stayed in Havana till the 10th, when they left for Matanzas, there to meet their host, doing so on the 13th at the coffee estate "San Antonio," better known as "El Fundador de Canimar," situated on the right bank of the Canimar River in Matanzas Province. Pfeiffer returned soon to Germany. Otto made a few collecting trips about the Island, then continued to Caracas, Venezuela, while Gundlach remained, but always with the idea of continuing to Surinam, as per his first arrangement. While still in Cuba he was advised of the death of his good friend Dr. Hille, thus cutting off his opportunity to visit Surinam. Gundlach, nothing daunted, wrote his friends in Germany to sell no more stock, that he would repay what he had used with Cuban instead of South American specimens. He at once set to work collecting and shipping material till he had paid all his indebtedness to them, nor did he stop then, but as he used to say that he had no expenses, Booth having taken him into the family, he continued to send specimens to Germany long after he had settled all financial matters at Cassel.

In 1841, Booth moving from "Fundador de Canimar" to the estate "San Juan" near Cardenas City, Gundlach went with him, there widening his range of operations, taking longer trips, and among other things, in March, 1844, he secured his first specimen of the beautiful *Calypte helenae* (Lembeye), dedicating the species to Mrs. Booth, whose name was Helena. And here an example of Gundlach's unselfishness: he turned his notes and description of the species over to Lembeye, who was then writing a book on Cuban Ornithology ("Aves de la Ysla de Cuba," por Juan Lembeye, Habana, 1850, today a rare work), and who thus appears as the author of one of Gundlach's species. This is only one of the almost daily instances of Gundlach's unselfishness; in the same way he has lost many other species in all the branches of Zoölogy. Nor did he know the value of money; he said he needed none, at

least not more than for his bare needs, as clothing, etc. He had free transportation on all trains and coasting steamers; everyone liked him; he interested all with whom he came in contact. He was a most unassuming man, and full of knowledge, which he was willing to impart to any who were interested, but never thrusting it on anyone. It was said of him that he was one of the very few men that no one could censure. Almost childish in his ways, awkward in his movements, simple of dress, he would move from place to place with his "baggage," if "baggage" it might be called, as he did not carry much, but always looked neat. Never perspiring, even on the hottest tropical day, he did not need many changes of clothes, so he travelled "light." Nor was he particular as to where he slept. He told my mother one morning, when she asked him how he passed the night, that he always slept well because he had nothing to worry over; that when he went to bed it was to sleep, having nothing on his mind to bother him, and not even the mosquitoes kept him awake. He had never been in love, so he said, neither did he drink wines nor liquors of any kind, an unusual condition in a German who generally loves his beer; good Havana cigars could not tempt him; he had no palate, but took coffee for its stimulating effect. He was not a heavy eater, nor could he be called a light one. I have seen him start from home early in the morning with nothing but a sandwich in his pocket, and sometimes with but a dry biscuit, returning at night with it uneaten; he had forgotten all about it during the day, his interest being entirely taken in solving one of Nature's problems. Tall and angular of figure, noticeably thin, his kindly blue eyes made friends wherever he passed, while his many years under the sun of the tropics had made his skin dark, unlike the Teuton that he was. He dressed in drill, not of an expensive quality, as I remember it was of a mixed brown and white, or other darkish mixture. He often spoke with affection of his mother, making four trips to Germany to see her.

In 1844 he began his general collection, since become famous, the first specimen of which was a *Calypte helenae* (Lembeye), though he had begun on insects and shells while

living at "Fundador de Canimar" a few years before, keeping odd specimens.

In 1846, at a farm named "El Refugio," near the city of Cárdenas, he established his Museum, open to all who cared to see it, and strange to say there were many who journeyed there, more than 3,000 different persons in four years, a very good record for that time, when one considers the population of the Island, and the inadequate means of transportation. I am sure that today there are not one-third this number of persons in Cuba who have any interest, or even curiosity, to see a collection of Natural History specimens.

In 1849 Gundlach made his first visit to the "Cienaga de Zapata," that large fever-infested swamp, as impenetrable as it is interesting, nearly one-third the size of Matanzas Province, in whose southern border it is located. He went with a letter of recommendation from the Padre Ramón de la Paz y Morejón, a priest-naturalist, stationed at Guamitas, to his relatives at "Hato Zarabanda," on the edge of the "Cienaga," where Gundlach made several visits, stopping with don Pedro Morejón. It was then that he obtained his first specimens of *Ara tricolor* (Bechstein), the Cuban Macaw, then common but now quite extinct, as also his *Agelaius assimilis* (Gundl.) still a very rare bird in collections. While there, he was informed that the Cuban Ivory-billed Woodpecker, *Campephilus bairdii* (Cassin), could be found in the eastern portion of the "Cienaga," so at the beginning of 1850 he went with don Carmen Morejón, to "Hato Cabeza de Toro" on the "Ensenada de Cochinos" on its eastern side, where he had been told there was a specimen of this bird that always carried a long straw in its bill. This bird was shot, and what appeared to observers to be a straw was really an abnormally excessive growth of the upper mandible, which was 12 inches long, curving downward in a semicircle. This specimen may be seen today in the Gundlach collection at Havana, or a picture of it in his work on Cuban Ornithology. One early morning, after he had been up to his waist in the mud of the "Cienaga" since long before daybreak, waiting for a flight of the wary American White-fronted Goose, *Anser albifrons gambelli* (Hart),

he was at last rewarded by bringing one down, but before it could be retrieved there appeared out of the lagoon a crocodile which reached the bird while Gundlach was laboriously wading through the soft mud. Being quite put out by the theft of his specimen, but not having a proper load with which to punish the thief, he determined to return the next day and administer deserved justice. The next morning he was on hand at the same place, and to his great satisfaction saw rise out of the "Cienaga" a crocodile which, to judge from its size, was just the one he was after. Getting read to shoot it, he noticed that two more of the identical size had made their appearance. Gundlach put down his gun in doubt as to which of the three was the culprit, asking them "Which of you stole my goose? Was it you? or you? or perhaps it was you?" The crocodiles remained quite unconcerned swimming about the dark waters, and Gundlach, being unable to decide which was the real offender, desisted from his intention, fearing that the innocent might pay for the guilty. During this same year he discovered *Mimus gundlachii gundlachii* (Cabanis) on the Cayo de Santa Maria, opposite San Juan de Terán point to the north of Morón.

Mrs. Booth having died of cholera in 1850, Booth moved to the coffee estate "Arcadia" at "Limonar," Gundlach remaining at "El Refugio." Here, in January, 1851, he met don Simón de Cardenas, a meeting that ripened into a sincere friendship most useful to Gundlach, as he afterwards (in 1855) made his home, and later (1864) moved his museum to the "Fermina" or sugar estate of the Cardenas family, whence many of his most notable specimens came.

In 1852 Gundlach went to Havana, stopping with his friend, the schoolmaster-ornithologist don Juan Lembeye; here he met don Ramón Forns, who later got together the collection of birds, crustaceans, etc., that was purchased in 1876 by the Academy of Natural Sciences of Havana, and forms its collection. He also met for the first time Professor Felipe Poey, the father of Cuban Zoölogy, with whom he had been in correspondence since 1840. This meeting at the house of Poey was as follows: Poey had used frequently in his corre-

spondence with Gundlach the famous phrase of Horace "Animae pars dimidia meae," so when Gundlach entered Poey's home, unexpected and unannounced, he spoke the words "Animae pars............" to which Poey answered .... dimidia meae," thus completing the phrase and identifying each other. Poey was afflicted with a hemiplegia that incapacitated him for any field work, and only on very few occasions, after overcoming great difficulties by a supreme effort of will power, obeying that irresistible impulse of the naturalist, was he able to have the pleasure of seeing in nature the many forms which he had known only in the laboratory. Gundlach, on the other hand, living close to nature, was able to furnish the specimens from which Poey described many of his species.

In December, 1853, Poey, don Nicolás Gutierrez, then President of the Academy of Sciences of Havana, and don Patricio Paz, chief of the Havana Carabineers, all enthusiastic malacologists, determined upon a trip to the Isle of Pines, to which they invited Gundlach. At the last moment it was found inconvenient for them to go, so Gundlach was sent, the expedition being financed by the other three, the catch to be divided equally among the four. He spent some weeks in the neighborhood of Nueva Gerona, working the Sierra de Casas and Sierra de Caballos, with very good returns, especially in land shells.

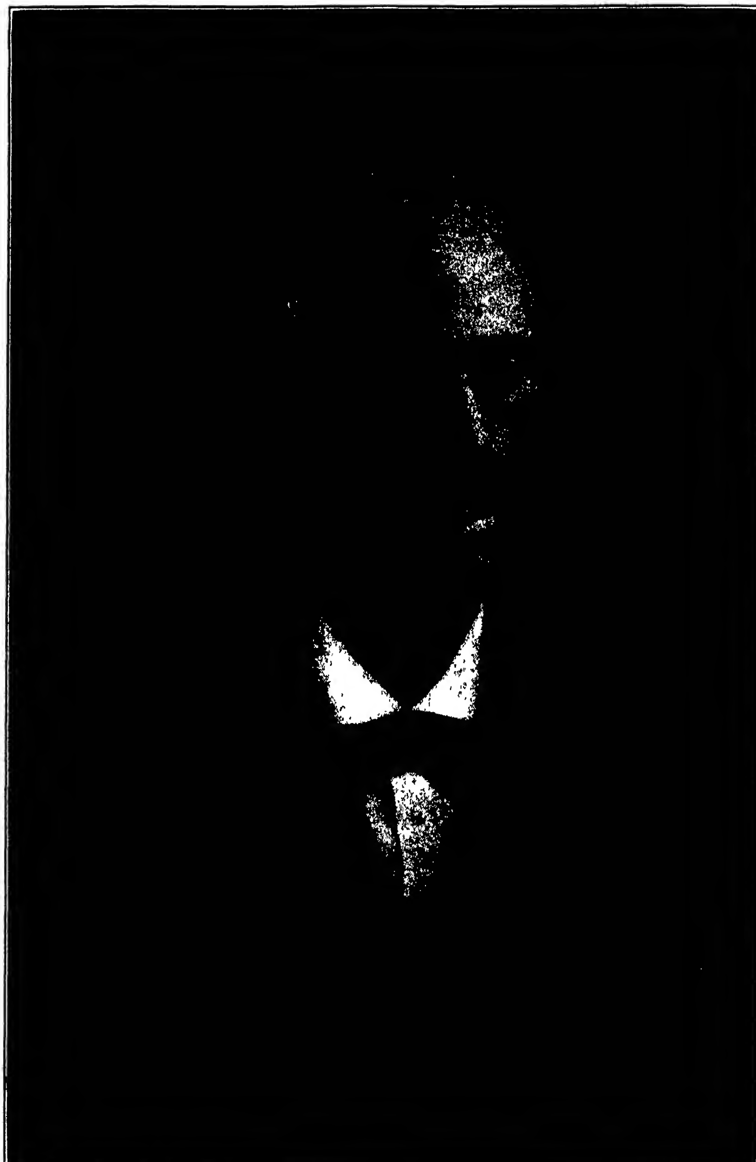
April, 1855, found Gundlach in Pinar del Rio Province visiting the botanist, Dr. Francisco Adolfo Sauvelle, who made it possible for him to continue to the home of don José Blain at "El Retiro,"and to the Sierra de Rangel. In May of this year he discovered among these heights the wonderful *Hymenitis cubana* (H. Sch.), which he at the time thought was *Hymenitis morgane* (Hubn.); also the Cuban Pine Warbler, *Dendroica pityophila pityophila* (Gundl.), and that beautiful variety of *Liguus fasciatus* that Poey named *blainiana* in honor of that generous host of all the naturalists of that day, besides many other interesting forms of the Cuban fauna, which make this range as famous for western Cuba as are the mountains to the north of Guantánamo for the eastern part of

the island; each intensely rich, a paradise for the collector. Gundlach returned from Rangel to Las Posas through San Diego de los Baños and Catalina, exploring on the way the slopes of the Guajaibón range, securing many species new to science, having spent a little over two months on the trip.

It was in June, 1856, under the auspices of Poey, Gutierrez and Paz, with a capital of a little over $200.00 furnished by them, that Gundlach began his first long trip through the Island. Curiously enough when he returned to Havana after over three years he had not spent the entire sum! It was arranged that Gundlach should get all types and uniques, while the duplicates were to be divided equally among the four. He first visited his former haunts in the "Cienaga de Zapata," from which he went to Cienfuegos, then to Trinidad, where he was cordially received by don Justo Germán Cantéro, a rich planter. He explored while hereabouts the "Vigia" of Trinidad, Casilda and "Boca de Guaurabo," as also Juan de Letrán, Magua, Güinia de Soto, Las Lagunas, Aracas, Sitio Quemado and while near Sancti Spiritus, he explored the Sierra de Banao, all with most satisfactory results in new species.

By February, 1857, Gundlach had reached Cape Cruz, Santiago de Cuba (now Oriente) Province where he at once made friends with the pilots that lived there. It was here that he was able to study and collect the Yellow-billed Tropic Bird, *Phaethan americanus* (Grant), examples of which he had seen from the sailing vessel when he had rounded the southern coast of Cuba nineteen years before. He also found here the *Cricosaura typica* (Gundl.), the most interesting species in the reptilian fauna of Cuba. Barbour, in his recent work, "The Zoögeography of the West Indies," Cambridge, 1914, says of this species: "This remarkable archaic monotypic genus has for herpetologists an interest equivalent to that which is held for *Solenodon* among students of mammals. Its excessive rarity..........makes it the most-to-be-desired booty of any naturalist who may collect in Cuba." From here also came the types of *Helix prominula* (Pfr.) and *Liguus poeyana* (Pfr.), the latter remarkable for its sinistral whorls.

Through Manzanillo he went to Bayamo, an interior town



JUAN GUNDLACH.

not far from the foot-hills of the Sierra Maestra range, arriving on June 13th at the Cafetal "Buenavista" of Aguilera, situated on the slopes of the Sierra Maestra. This magnificent range extends all along the southern border of Oriente Province, from Cape Maisi on the east to Cape Cruz on the west, rising, in some instances directly from the sea to a maximum height of some 7,000 feet at "Pico de Turquino,"* a still, zoölogcally, unexplored peak, the highest in the island. While staying at "Buenavista" he obtained specimens of that rarest of mammals, the *Solenodon cubanus* (Peters), a female of which served Dr. Peters for his excellent Monograph of the species; this also is the type locality for *Capromys melanurus* (Poey), a rare mammal in collections. In this same range, at a place five miles to the east of the mouth of the harbor of Santiago de Cuba, where the Aguadores river cuts its way between deep cañons to the sea, he shot, in December, 1857, what he considered one of his best prizes, the beautiful *Papilio gundlachianus* (Feld.). I well remember hearing him tell how he procured his first specimen of this butterfly. He was collecting the diminutive *Calypte helenae* (Lembeye), when he noticed this strange butterfly over his head; at once recognizing it as new, but having no net, he shot the specimen with "dust" shot! I could still go to the spot where this specimen was taken, where the Aguadores river, some 600 yards from its mouth, runs through a deep cañon, and here I have waited patiently for the colored beauties to come sailing down from above, stopping for a moment at some flower before going up the opposite side of the cañon. I never saw it come down the river, but always across, down one bank and up the other. It was at this spot that Albert Bonzon, in 1888, discovered its larva feeding on one of the *Aristolochiae*.

Gundlach returned from "Buenavista" to Manzanillo and Cape Cruz in the autumn of this year, then sailed to Santiago de Cuba on a schooner, the skipper of which not only refused to charge him for his passage, but offered to take him free to any place on the coast he might desire, so pleased was he with

*[The "Century Atlas" gives the elevation of Pico de Turquino as 8,400 feet.—Ed.]

Gundlach's personality. Arriving at his destination in December, he stopped with his friend, the Swiss watchmaker, Charles Jeanneret, of malacological fame, who was later, while on a collecting trip, during the Cuban "Ten Years' Revolution," most vilely murdered by the Spaniards, who claimed he was a spy of the insurgents. While at Santiago, Gundlach, accompanied by Jeanneret, made side trips to "Brazo de Cauto," Enramadas (now San Luis), Rincón, La Gran Piedra, and Santa Maria de Sabine, where he found that interesting form of *Pleurodonte* (*Caracolus*) *sagemon* christened *jactata* by Gundlach. He returned for the third time to Cape Cruz in April, 1858.

His first visit to the rich collecting grounds about Guantánamo was in June, 1858, when he lived six weeks at the railway station at Caimanera on Guantánamo Bay, where he collected along its shores. Having found in July, on one of the immense sand flats of that region, a nesting Snowy Plover, *Aegialitis nivosa* (Cassin) with a set of three eggs, he took the mother alive in a bird-net, sending her to Mr. Lawrence, who described it as *Aegialitis tenuirostris* (Law.), but Dr. Ridgway later determined the species to be *A. nivosa* (Cass.). At the mouth of the Guantánamo river, where it empties into the bay, he found the dead and bleached specimens of *Thelidomus emarginata* (Gundl. ms.) that served as types for this species. From Caimanera he went to the town of Guantánamo as the guest of Mr. Theodore Brooks, doing some collecting, then proceeding with don Enrique Lescaille to the latter's cafetal "Ermitaño" on the Yateras range, where the hospitable planters disputed over who should be next honored by having Gundlach as guest. It was on this range that he discovered the type of *Clothilda cubana* (H. Sch.), and also rediscovered that rarest of Cuban butterflies, *Hymenitis cubana* (H. Sch.), the type of which he had taken in 1855 on the ranges in Pinar del Rio Province in the extreme western end of the Island; he was never able to find this species on the mountain ranges of the Central Provinces. Of no less interest was his find of the beautiful *Cydimon poeyi* (Gundl.), whose type he took in February, feeding on the

flowers of the Alligator Pear. Mistaking this species for the *Cydimon boisduvalii* (Guer.) of western Cuba, he did not take many specimens, a fact which he always lamented in after years. He visited, at "San Andrés," the last of the pure-blooded aborigines of Cuba, the Rojas family, a race now extinct. Exploring Monte Toro and Monte Libano, two zoölogically famous ranges, he found in the latter that extraordinary Urocoptid, *Brachypodella brooksiana* (Gundl.), which he named in honor of his first host in Guantánamo. Continuing across toward the north coast of Oriente Province as far as "Santa Catalina," and returning through Guantánamo and Caimanera to Santiago de Cuba early in 1859, he started for Baracoa, the home of that most beautiful of land shells, the *Helix* (*Polymita*) *picta* (Born.) of which nearly 1000 color variations are known, each vying with its neighbor in beauty. Arriving at Baracoa in May of this year, he visited Mata, on the east, there taking the largest of the Cuban land snails, *Helix* (*Polydontes*) *imperator* (Montf.), then very rare in collections, and not now easy to find alive. He climbed that curiously formed height El Yunque, a landmark of all mariners who pass along this portion of the Cuban coast, and on the top took the interesting *Helix* (*Polydontes*) *apollo* (Pfr.). While at Baracoa he captured the type of *Chlosyne perezi* (Gundl.) and visited a curious palm, from the trunk of which protruded ten branches, each with its fronds at the top. In August he began to work his way back toward Havana, along the northern border of the Island passing through Gibára, Nuevitas and Puerto Principe (now Camagüey), arriving at Havana on the 15th of August, 1859, after an absence of a little over three years, well repaid in genera and species for his hardships.

The next four years (1860-1864) he spent in determining and putting in order the material collected, sending specimens to the different specialists of Europe and America. About this time it became fashionable among the wealthy of Havana to adorn their drawing-rooms with Natural History specimens. Gundlach was kept busy furnishing these, and thus became

known to the most influential Havanese of that day, who gave him all the help and encouragement possible.

In 1864, at the repeated invitation of don Simón de Cárdenas, Gundlach decided to move his museum to the sugar estate of "Fermina," of the Cárdenas family, where he could the better attend to it. Here his collections were placed in an upper room of the building used as a hospital for the slaves of the estate.

In 1865 he published his Catalogue of Mammals, Birds and Reptiles, in the "Repertorio Fisico-Natural de la Ysla de Cuba" of Poey. The next year the municipality of Havana commissioned him to take charge of the Cuban zoölogical exhibit at the Paris Exposition of 1867. He personally attended to the packing and shipping of these, as well as of his own, while he followed in February of the next year, being awarded a medal and diploma for his exhibits. The Exposition over, he returned to Cuba in 1868, after visiting friends in Germany, to repair the damage done the specimens, which were not handled lightly *en route*.

The "Ten Years Revolution" having broken out in October, 1868, it became dangerous to do any further collecting in the field. In fact, Gundlach was once taken prisoner by some Spanish soldiers and presented to their captain, who, much to the amazement of his men instead of throwing him into a dungeon to rot, received him with open arms, at once setting him at liberty, and at the same time advising him to give up his excursions on account of the danger, so Gundlach, taking his friend's advice, remained at the "Fermina" estate. Here, since he could not go to the field, he did the next best thing; he brought the field to the estate grounds by planting many vines, shrubs and trees about his quarters, thereby enticing the butterflies, etc., to lay on their larvae's food plants, and thus he collected many rare species without the danger of being arrested, and perhaps shot. He was able to study at ease many larvae that otherwise would have been difficult to examine, and got many of the shiest birds to nest in the trees about his garden. Professor Carlos de la Torre, that eminent Cuban naturalist of to-day, to whom I am greatly indebted for

much information for this article, tells me that in 1882 he saw a pair of humming birds, *Riccordia ricordii ricordii* (Gervais), nesting in an unused chandelier in Gundlach's room at the "Fermina" estate. The birds would fly in at the window, to the table where Gundlach worked, taking bits of cotton and tow to build their nest, such was his gentleness.

Since 1866 Gundlach had been invited by the Jesuit priests at San Juan, Porto Rico, to form a collection for their school in that city, but his attendance at the Paris Exposition obliged him to decline. He was again invited in 1870, this time by the then German Vice-Consul at Mayagüez, Herr Leopold Krug, who shortly after left for Berlin, so Gundlach did not decide to visit the Island till 1873, when, seeing that the revolution in Cuba was not waning, he embarked at Havana on the 4th of June of that year on the steamer "Manuela" for Mayagüez, where he got in contact with the amateur naturalists of the Island, such as Dr. Domingo Bello Espinosa (botanist), of Mayagüez; Mr. Halmarson (ornithologist), of Arecibo, and, on his second trip, with Dr. Agustin Stahl of Bayamón, well known to all who have worked Porto Rico zoölogically. It was Dr. Bello Espinosa who, in 1871, first discovered that the genus *Eleutherodactylus* (*Hylodes*) did not undergo all the transformations usual with the frogs, and Gundlach, in 1881, made further research on this same subject, sending his results to Dr. Peters, of Berlin, who then described and figured eggs and embryos of the *Eleutherodactylus martinicensis* (Tschudi). Gundlach remained in Porto Rico for six months, working over Aguadilla, Guánica, Lares, and Utuado in the interior, as also Arecibo on the north coast and Quebradillas, returning to Havana, where he arrived on December 4th, 1873.

His second Porto Rican trip was begun on the 4th of September, 1875, when he embarked on the steamer "Marsella." His work on this occasion was for the most part about Vega Baja, and Bayamón, where he was the guest of Dr. Stahl. Returning, he arrived at Havana on the 25th of August, 1876, making a third trip in 1881, remaining there for some time.

Alternating with these trips he worked on the publication of his writings on Cuba and Porto Rico. The former were

published in the "Anales de la Academia de Ciencias de la Habana" and the latter in the "Anales de la Sociedad Española de Historia Natural de Madrid," at the same time being published in Germany (see bibliography). This work he kept up till the last days of his life.

In 1882, Dr. Carlos de la Torre, then Curator of the Museum of the Institute of Havana, indicated to Dr. Fernando Reynoso, its Director, the necessity of forming a collection of Cuban examples, proposing Dr. Gundlach as the best man for so doing. A trip to the "Fermina" estate was arranged, where they spent a very pleasant week with Dr. Gundlach and the Diago-Cárdenas family. Reynoso, very much pleased with what he saw, proposed that Gundlach should move to Havana, but this the latter would not listen to, as he had become almost indispensable to the Cárdenas for whom he had the highest esteem, and to whom he was most grateful for the many kindnesses received from don Simón long before. Reynoso, though not a naturalist himself, took great interest in all who were so inclined, protecting them in any way possible, and did so now to Gundlach by ordering from him specimens for the proposed Cuban collection at the Institute, while at the same time cherishing the hope of being able to purchase Gundlach's entire collection. Through Reynoso's desire to help him, Gundlach made trips to eastern Cuba in 1884 and the spring of 1885, again in 1887 and 1888, in the interest and for the account of the Havana Institute. These trips were made to places already visited, with the object of securing additional examples of rare local species. After 1888 Gundlach made no more explorations, occupying himself in moving his collection to Havana and into the Institute, by putting in order the general collection already there, as also other smaller collections. He, however, continued to publish his observations till 1893, when he published his last large work, "Ornitologia Cubana," edited by Dr. Enrique Lopez, of the Policlinica. In 1894 he wrote three articles in the Annals of the Institute of Havana (see bibliography).

Meanwhile, the financial situation of Gundlach's adopted family was going from bad to worse, as was generally the case

with the families of that day; the "Fermina" was abandoned as a sugar estate, and let out as a pasture, which in time was lost; so Gundlach had no reason for longer remaining on the place. Dr. Reynoso, who had never lost hopes of acquiring the collection, and because of the friendship he had for Gundlach, renewed his offer of purchase. Gundlach, who under no other circumstances would have parted with his treasure, saw in Reynoso's proposition the fulfillment of his desires—that the collection should remain as a whole and not be removed from the Island he had learned to love, and that he would be able to aid the Cárdenas family with the price thereof, and thus materially show his gratitude to them for the many kindnesses received from their ancestor. He accepted the offer, and after the usual amount of red tape attached to all official business in Spanish-American countries, the authorities sanctioned the purchase, at the price of $8,000.00 Spanish gold, a price much below the real value of a collection that contained so many types, cotypes and uniques. Reynoso, however, partially made up for this by purchasing other specimens, and helping Gundlach in other ways, while the tedious "red taping" was in progress, commissioning him to prepare the place where the collection was to be housed, and lastly by naming him curator for life of the same at a salary of $100.00 Spanish, a month, which amounts, as well as any and all others that he received, were handed over to Mrs. Cecilia de Cárdenas de Diago, the daughter of his protector, who now in turn was in need of being protected.

Finally, in May, 1892, authorized by a royal decree at Madrid, under date of April 8th, the deed of sale by Gundlach to the Institute was signed, and he received the $8,000.00 Spanish gold, upon which he went directly to Mrs. Cárdenas de Diago, placing in her hands the entire amount, saying: "This does not belong to me; it is yours; I leave it with you knowing full well that you will employ it with the same high purpose and generosity that you have granted this humble servant of science, and who feels eternally united to you and yours by the most sincere bonds of gratitude and love." Thus

did Gundlach show his gratitude to the children of his benefactor.

The collection was completely installed in its new quarters by the middle of 1895, and on the 17th of July of this year, Gundlach celebrated at the Museum his eighty-fifth birthday, a very happy man, his ambitions achieved, surrounded by his many friends, among whom were the Cárdenas, who were present to see once more the collection they had lost sight of for eleven long years. Unfortunately he was to enjoy this satisfaction but a short time. An attack of grippe developing into broncho-pneumonia hastened the end. He nevertheless continued attending to his daily duties at the Museum till approximately a month before his death, when upon getting out of a car on his way home, he fell in a syncope, having to be carried in a chair to his house at (old) No. 51 5th Street, corner of "G," Vedado, Habana, which he did not again leave alive. He slowly weakened, though most tenderly nursed through this, his last illness, by Mrs. Cecilia de Cárdenas. It was she who gave him his last glass of milk after drinking which he turned over and quietly fell asleep never to awake. Thus passed away, on the 17th of March, 1896, the dreams of his life realized, one of the noblest men the world has known.

There is not much more to be said. The collection is today as he left it in its mahogany and glass cases in the specially built department over the Library of the Institute. The fronts of the cases are screwed, and only opened from time to time for cleaning. The room is kept closed, but the collection may be seen by special appointment by any who may be interested. A few of the smaller specimens have deteriorated and some have disappeared, otherwise they are in good condition. Its present curator is Dr. Pedro Valdés y Raguéz. Gundlach's library is also at the Institute, but Dr. Carlos de la Torre has his entomological and malacological note books, while Dr. Torralbas has an unedited work of Gundlach's on the Crustaceans of Cuba.

List of Honorary Memberships Accorded Gundlach.

1851, April 5th.	Honorary Member of the Boston Society of Natural History.
1853, Jan. 31st.	Corresponding Member of the Natural History Society of Montreal.
1853, May 13th.	Corresponding Member of the Society of Natural History of Waterau.
1861, May 26th.	Socio de Merito, of the Academy of Sciences of Havana.
1864, Jan. 11th.	Corresponding Member of the Entomological Society of Philadelphia.
1864, July 19th.	Honorary Member of the Naturalists Society of Boston.
1865, Mar. 28th.	Member of the Department of Sciences of the Lyceum of Matanzas, Cuba.
1865, May 24th.	Socio de Merito of the Sociedad Económica de Amigos del Pais de la Habana.
1867, June 25th.	Corresponding Member of the Academy of Natural Sciences of Philadelphia.
1872, Dec. 5th.	Member of the Sociedad Española de Historia Natural de Madrid.
1878, Aug. 23rd.	Socio de Merito of the Círculo de Hacendados de la Habana.
1883, July 10th.	Corresponding Member of the Museo de Historia Natural de Madrid.
1883, Sept. 28th.	Honorary Fellow of the American Ornithologists' Union.
1885, Oct. 6th.	Honorary Member of the Brooklyn Entomological Society.
1886, (first half)	Honorary Member of the Entomological Society of Berlin.

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[The portrait of Gundlach reproduced on Plate VIII is from a photograph which has long been in the collection of the American Entomological Society. It may have been received not long after Gundlach's election as a corresponding member of the Entomological Society of Philadelphia (Jan. 11, 1864). The portrait on Plate IX is from a photograph, dated on the back February, 1885, and forming a part of Prof. P. R. Uhler's collection, presented by Mrs. Uhler to the American Entomological Society in 1914. The fac-simile of Gundlach's autograph on Plate VIII is from a letter to Mr. E. T. Cresson in May, 1866. It will be noted that the first name is there written "Johannes." On the title pages of the Entomologia Cubana, the author's name is spelled "Juan Gundlach."—Ed.]

Additions to Insects of New Jersey, No. 2 (Lep.).

By Harry B. Weiss, New Brunswick, N. J.

With a few exceptions, the records for this list were received through the kindness of Mr. Otto Buchholz, of Elizabeth, N. J. Mr. Buchholz also gives the following food plants for species in the 1909 list, where food plants were lacking. *Nonagria laeta* Morr., larvae in *Sparganium*, Bird; *Achatodes zeae* Harris, larvae in young alder shoots; *Apamea velata* Wlk., larvae in *Carex stricta; Catocala similis* Edw., larvae on scrub oak; *Papaipema speciosissima* G. & R. larvae in royal and cinnamon ferns.

Mr. Frank M. Jones, of Wilmington, Delaware, informs me that *Exyra semicrocea* Gn. in the 1909 list should be replaced by *Exyra rolandiana* Grt., the larvae of which occur in *Sarracenia* wherever that plant grows in any quantity in New Jersey. He has investigated the New Jersey records for *semicrocea* and found that the specimens were *Xanthoptera semiflava* Gn. in every case. *Semicrocea* is not represented from New Jersey in the New Brunswick collection and considering all of the evidence presented, should be omitted from the list.

LEPIDOPTERA.

Diacrisia virginica Fab. var. **fumosa** Strecker. Passaic Park, Jan. 20, 1915. Found in house on window. M. H. Mead.

Acronycta (Apatela) albarufa Grt. Lakehurst, middle of July. Buchholz.

Acronycta (Apatela) brumosa Gn. Lakehurst, end of May. Buchholz.

Acronycta (Apatela) lanceolaria Grt. Elizabeth, June 22. Buchholz.

Hadena stipata Morr. Elizabeth, 1st half of August. Buchholz.

Noctua rubifera Grt. Lakehurst, August & September. Buchholz.

Leucania (Heliophila) juncicola Gn. Lakehurst, middle July. Buchholz.

Leucania linita Gn. Newark, (Ang.); Elizabeth, May, August, (Bz.); Five-mile Beach, Aug. 12, (Haim.).

Leucania scirpicola Gn. Elizabeth, Lakehurst, July, August. Buchholz.

Leucania subpunctata Harvey. Lakehurst, Oct. 9, 1914. Shoemaker & Davis.

Hydroecia stramentosa Guenee. Passaic Park, Sept. 18. At arc light. M. H. Mead.

Papaipema duovata Bird. Larva in *Solidago sempervirens.* Elizabeth, Sept. 14 to 30. Buchholz.

Papaipema eupatorii Lyman. Larva in *Eupatorium purpurea.* Elizabeth, Sept. 20 to 30. Buchholz.

Papaipema frigida Sm. Larva in meadow rue. Union Co., Sept. 1 to 30. Buchholz.

Papaipema impecuniosa Grt. Larva in *Aster puniceus.* Union Co., Sept. 15 to 30, Buchholz. Passaic Park, Sept., Mead.

Papaipema pterisii Bird. Larva in *Pteris aquilina.* Union Co., Aug. 25 to Sept. 5. Buchholz. Passaic Park, Sept., Mead.

Papaipema harrisii Grt. Record in 1909 list based on misidentification. Does not occur south of Maine. Buchholz.

Papaipema cerina Grt. Union county, middle Sept. Larva in *Lilium canadense.* Buchholz.

Papaipema moeseri Bird. Union county, end Sept. Larva in *Chelone glabra.* Buchholz.

Papaipema merricata Bird. Elizabeth, Sept. 20. Larva in may apple. Buchholz.

Papaipema stenocelis Dyar. Lakehurst, Sept. 8 to 25. Larva in *Woodwardia virginica.* Buchholz.

Papaipema duplicata Bird. Union & Essex counties, Sept. 15 to 30. Larva in horse balm. Buchholz.

Papaipema maritima Bird. Union county, Sept. 20 to Oct. 10. Larva in *Helianthus giganteus* & *H. tuberosus.* This record should take the place of *necopina* in the 1909 list, which was wrongly identified. *Necopina* has never been taken south of Buffalo, N. Y. Buchholz.

Papaipema lysimachia Bird. Union county, Sept. 5 to 30. Larva in *Lysimachia quadrifolia.* Buchholz.

Papaipema baptisiae Bird. Union & Essex counties, Sept. 15 to 30. Larva in false indigo. Buchholz.

Papaipema astuta Bird. Union & Essex counties, Sept. 5 to 22. Larva in horse balm. Buchholz.

Papaipema anargyria Dyar. Elizabeth, Sept. 7. Larva in *Eupatorium.* Buchholz.

Papaipema rigida Grt. Union county, Sept. 5 to 30. Larva in *Heliopsis helianthoides.* Buchholz.

Ochria (Gortyna) buffaloensis Grt. Elizabeth, end August. Buchholz.

Scopelosoma ceromatica Grote. Passaic Park, April. M. H. Mead.

Epiglaea tremula Harv. Lakehurst, Sept. 25. Buchholz.

Chloridea virescens Fab. Lakehurst, Oct. 11, 1914. E. Shoemaker, W. T. Davis.

Schinia obscurata Strk. Elizabeth, June 5 to 30. Buchholz.

Autographa rogationis Gn. Elizabeth, Sept. 15 to 30. Buchholz.

Erastria includens Wlk. Elizabeth, July 5 to 20. Larva in *Carex stricta.* Buchholz.

Exyra rolandiana Grt. Spring Lake, Toms River, Pleasantville. Larva in *Sarracenia.* F. M. Jones.

Catocala fratercula Grt. var. **jaquenetta** Hy. Edwards. Lakehurst, July. Buch.

Epizeuxis nigellus Strk. Elizabeth, Lakehurst, July. Buchholz.

Anaplodes remotaria Wlk. Union & Passaic counties, July 20 to August 10. Buchholz.

Eois demissaria Hbn. Lakehurst, May 30 to June 20. Buchholz.

Apaecasia deductaria Wlk. Elizabeth, June 7. Buchholz.

Cleora tacenaria Pearsall. Lakehurst, July 17. Buchholz.

Euchlaena obtusaria Hbn. Lakehurst, May, July, September. Buchholz.

Priocycla decloraria Hulst. Lakehurst, July 3. Buchholz.

Gracilaria azaleae Busck. Larvae on azaleas. In greenhouses in northern New Jersey. Not common. H. B. Weiss.

How Does the House-fly Pass the Winter? (Dipt.).

By Henry Skinner.

In Entomological News, xxiv, 303, 1913, I published an article with the above title and stated that I believed that in the vicinity of Philadelphia *Musca domestica* lived through the winter in the pupal stage. This article led Dr. S. Moncton Copeman and Mr. E. E. Austen to investigate the same subject in England. They published the results of their investigations in "Reports to the Local Government Board on Public Health and Medical Subjects, New Series, No. 102, 1914, London, England." They sent out appeals, for specimens, to be published in certain journals. The notice was printed in "Country Life," "The Entomologist" and "The Entomologists' Monthly Magazine." From January 19 to April 27 they received fifty-eight consignments of flies, representing fifteen species. They gave an extensive tabulated report of the specimens received which is very interesting and instructive. Their summary and conclusion is as follows: "It will be seen from the appendix that the results obtained afford no support to the belief that house-flies hibernate in this country [England] in the adult state. The few specimens of *Musca domestica* sent in were all taken in an active condition; some of the other flies, however, such as the extremely common *Pollenia rudis* F., were often found partially dormant, and it is difficult to resist the conclusion that did the house-fly really hibernate in the adult state some evidence of the fact must have been obtained. The idea suggests itself that the relative lateness of the season at which house-flies annually become abundant may be due to the smallness of the number of individuals that, in an active condition, survive the winter in houses and other buildings, although it must be admitted that as yet [there is] nothing in the shape of proof that female house-flies found alive at the end of winter actually survive until oviposition takes place." They say in conclusion "it would appear that the customary explanation of the perpetuation of the house-fly from year to year has now been fairly tested, and that the evidence obtained fails to support it."

On February the 15th of the present year, the windows of the Entomological Department of the Academy of Natural Sciences of Philadelphia were opened on account of the mild weather, and house-flies (*Musca domestica*) came in. Previous to this date no flies were seen in the rooms. A local newspaper contained the following item: "Philadelphia experienced yesterday one of the warmest February 15ths in the history of the weather bureau. At 1.30 o'clock in the afternoon the thermometer touched 67 degrees F., which was the highest reached by the mercury on February 15th in forty years. As a result of the unusually mild weather conditions many men cast aside their overcoats, while hundreds of women appeared on the streets without furs." No special effort was made to obtain house-flies and only those that came conveniently within reach were caught. Some were netted and killed in a cyanide bottle and some were "swatted." Mr. E. T. Cresson, Jr., the well-known student of the Diptera, has given me the following report on the *Musca domestica* taken early this season.

Two females killed February 15th at the Academy. Chitin soft, and in drying the face and abdomen of the fly became very much shrunken. The clean pollen and undamaged bristles indicated recent emergence from the pupa.

One female February 17th showed same condition, but less shrunken.

One male February 23rd. Very much shrunken. This specimen was mutilated from the method of killing, being swatted.

One female Philadelphia, Pa., April 6th. Well developed and clean.

It is significant that no hibernated specimens were seen. Also that a freshly-emerged male was taken. It is, therefore, a fact that house-flies of both sexes emerge from pupae in the late winter or early spring and that these flies are capable of producing the heavy summer broods. These facts show how little we really knew about this very common insect in relation to hibernation, and there is still much to be known and put on a firm basis. It is hardly worth while to speculate in regard to the living through of some females capable of oviposition in the spring. This awaits exact observation. It will also be of value to look for living pupae in the winter and early spring.

Observations in Southern Pines, North Carolina (Hym., Col.).

By Abram Herbert Manee.

VESPA CUNEATA = V. CAROLINA LINN. (HYMENOPTERA.)

About three years ago Mr. Charles Schaeffer suggested that I investigate the suspicion that the large *Vespa carolina* might be a form of *V. cuneata*. I had observed that *carolina* was always female, was always solitary and in spring or early summer was about some large pine stump; that *cuneata* male was rare and in autumn *cuneata* female was busy in young pines or was attracted to wet spots on trunks of oaks.

About noon of October 28, 1914, on a woodsy side road my wife noticed some hornets about a hole in the ground, and as I found them to be females of *cuneata* I knew my opportunity was at hand. The next day with my nippers I took at the opening about 250 specimens, at first females that were going in or coming out for forage, latterly males who were disturbed by my poking into the nest. Then I removed the covering of leaves and scooping out the contents with my hands disclosed a smooth perfectly bowl-shaped excavation. This was lined with wasp paper. At the rounding bottom was a small thick disc of comb containing grubs, a few empty cells and, in sealed cells, some pupae and imagines of *Vespa carolina*. The second tier was a larger disc comb, also containing the three stages of *carolina*. The third comb was also a perfect disc, nearly seven inches in diameter but thin and with many cells empty, with a few at edge with grubs and with some sealed cells containing pupae and imagines of *V. cuneata*, some males, some females. The fourth comb was like the third but with more of the cells empty. The fifth and top disc came out in pieces but was entirely empty and looked somewhat dry and old. The cover of woods debris allowed an exit at the right corner of a mouth-shaped aperture.

Of the 539 free specimens taken 330 were *cuneata* males, evidently drones somewhat sluggish and abiding in the nest; 174 were *cuneata* females, workers busy at the care and feed-

ing of grubs with probably a large number away for forage, and 35 were *carolina* queens. It seemed evident that the queens and males and some workers had but recently emerged. It is probable that most of the workers had developed in the uppermost comb and in time to foster the life in the lower tiers.

The male has a longer body with one more cross stripe than has the worker. The queen name *carolina* must prevail for the species even if it were not older than *cuneata*, unless, for historical import, it be henceforth known as *cuneata-carolina*.

.DYNASTES TITYUS (COLEOP.) AND SPHECIUS SPECIOSUS (HYMENOP.)

My first sight of *tityus* was on coming south in the autumn of 1904, when I found a dead female in our barn and the World of the Little grew larger. On June 26, 1905, a pair was brought to me from an orchard of early peaches. In after summers I would take 50 to 75 specimens at their mid-July gathering in and under a single tree of early apples. Their allurement was the over-ripe or rotting fruit. Earlier and later they came to peaches. plums and pears. Here is a decided example of mimetic coloring not only in the normal brown-spotted pear-green but in the occasional wholly brown wing, or wings exactly the hue of a rotten apple or pear. The natural odor of living specimens is peculiar and very strong. This, in connection with denatured alcohol and the decay of body contents, renders specimens so preserved somewhat offensive, but in time the smell will pass away.

In my ten years here I have not seen the pupa, but several times have taken the huge grubs in the rotting side-roots of old pine stumps. October 17, 1914, I thus found larvae and a small female imago. But of most interest is the peculiar habit of a late summer gathering on ash trees. I was told that the tropical *hercules* clustered on tree trunks. On July 30, 1909, a boy brought me 31 *tityus* and the next day 155 more, all taken from an ash tree at a farm two miles south. August 22, 1910, the same boy brought me 189 specimens taken from the same tree, which he called black ash. On September 3,

1912, I discovered, a few rods from my home, the only ash tree of which I know as within a radius of two miles and from it took 27 living *tityus* and from the ground many dead specimens. I noticed that the branches of the ash bore fresh long gashes through the bark; also that several of the big wasp *Sphecius speciosus* were flying about the upper limbs. In 1913 I saw at this ash tree not one *tityus,* but found *Xyloryctes satyrus* burrowing at the base of the trunk. In July, 1914, I took from this one ash tree 387 live *tityus* and observed on the bark of the branches the deep scratches which the beetles had made or were making and, at the abandoned scars, wasps, *Arachnophroctonus atrox* or *Sphecius speciosus,* were eagerly at work evidently feeding on some exudation of the wounded inner bark, though to me the spots looked dry. At times two female *speciosus* would contend and fall together to or near the ground in combat; at times a wasp would attack a beetle as if in hungry impatience it would drive it from the coveted feast. Only three or four pairs of *tityus* were mating, but on the ground a few of each sex were burrowing at the base of the ash and also at nearby dogwoods. I also took from the ground some male *Xyloryctes.*

On August 4, I observed a large number of fresh scars on the rough outer bark of the ash trunk and two or three half-inch holes freshly bored to the wood. At one of these holes, three feet from the ground, a female *tityus* was at work but it did not attempt to oviposit nor could I find an egg. The beetle was restless and leaving the hole began a spiral climb to the branches, ten feet above, and as it moved it would here and there, with an upward push of its head, remove a crumb of bark. The object of this or of the half-inch holes I could not conceive and of course I left the beetle to mother a next season's progeny, which I suspect requires two years for maturing. November 13, I dug at the base of the ash tree and found two male *Xyloryctes* hibernating (also three nymphs of *Cicada sayi*), but no grubs and no trace of *tityus.* The roots were all sound.

Dynastes tityus varies remarkably in size. Males are from

35 mm. x 19 mm. to 60 mm. x 28 mm.; females from 35 mm. x 18 mm. to 50 mm. x 25 mm., while one female, almost a freak in size, attained to 52 mm. x 27 mm.

As to the Cicada Killer, *Sphecius speciosus,* I have seen it climbing a telegraph pole, with its heavy burden of *Cicada marginata,* that it might glide on a stage of its nestward journey; I have seen by a roadside its inch-wide hole in the ground; I have seen it in early July with the male of *Sphaerophthalma occidentalis* feeding at the gum of acorn buds; I have seen it later at wet spots on trunks of oaks as also at *tityus* scratchings on ash limbs and, like hornets and some Lepidoptera, it may feast on the dropped fruit of persimmon.

A Wasp Resembling a Bee (Hym.).

By T. D. A. Cockerell, Boulder, Colorado.

All entomologists have heard of the remarkable resemblances between certain butterflies of quite different families, but it is not so well known that in Australia the aculeate hymenoptera present some astonishing examples of "mimicry." A new example, now before me, is found in a small wasp of the genus *Miscothyris,* from Gilgai, New South Wales, December, 1911 (*W. W. Froggatt* 211), which in appearance and markings almost perfectly resembles certain bees, more particularly *Euryglossa geminata* Ckll., both being black, with the same general arrangement of yellow markings on the scutellum, postscutellum, second abdominal segment, &c. The *Miscothyris* appears to represent a color-variety of *M. lucidulus* Turner.

Miscothyris lucidulus mimeticus n. race.

♂. Like *M. lucidulus,* but flagellum ferruginous beneath; upper border of prothorax (except laterally), spot on tubercles, large mark behind them, as well as scutellum and postscutellum, clypeus, lateral face marks, triangular supraclypeal mark, scape (except a black mark behind), and spot on each side of second abdominal segment, all bright chrome yellow; anterior tibiæ with a broad yellow band in front.

M. lucidulus was described only from the female; it is possible that the differences found in the present insect are sexual, but they probably indicate a local race. Two specimens are before me. The type is in my collection; it will, however, eventually rest in some large museum.

List of Coleoptera Collected from Tanglefoot.

By C. A. Frost, Framingham, Mass.

The following species of beetles were taken from bands of tanglefoot on two large white oak trees in Sherborn, Massachusetts. These trees are situated in a pasture at the foot of a wooded hill and are partly surrounded by a sparse growth of hardwoods which are replaced on the east by alders that extend to an open meadow a few hundred feet away.

The results of the first visit on September 27th were so surprising that a second trip was made to secure any small specimens that had been overlooked. On the shaded side of one of the trees next the swamp most of the specimens were badly moulded and were not removed at all, while a few other specimens looked as though they had been pecked by birds. These two trees, which are nearly three feet in diameter, were banded about the first of June so that most of the material must have been entangled for many weeks and some of it for three months. Most of the specimens were dug out as mere gobs of tanglefoot and dropped into the alcohol bottle where they remained about five hours. They were then found to be very clean except for a whitish substance on a few of them. The large ones were also relaxed enough to pin while the legs and antennae of the small specimens could be drawn out by the careful use of a fine brush.

The number of rare species is the most remarkable fact in this list for, in the fourteen years of my collecting in Massachusetts, I have never before taken *Cinyra gracilipes, Fornax calceatus, Catorama nigritulum, Dorcatoma dresdensis, Abstrulia tessellata, Canifa pusilla, Helodes thoracica* or *Heterachtes quadrimaculatus,* and but single specimens of *Entomophthalmus rufiolus* and *Callidium aereum; L. cava, S. punctatus, C. sexsignata, C. bicolor,* and *H. unifasciata* have been exceedingly rare.

On my return from the second visit to the trees (October 3, 1914), I examined some red oaks that had been banded with tanglefoot in 1911 or 1912 and took therefrom single specimens of *Bostrychus armiger* Lec. and *Notiolophus semistriatus*

Say. They were about the only specimens in recognizable condition.

The summary of the following list shows a total of 83 specimens representing 39 species.

List of Species and Number of Specimens of Each.

2 *Axinopalpus biplagiatus* Dej.
1 *Lomechusa cava* Lec.
2 *Adalia bipunctata* Linn.
6 *Scymnus punctatus* Melsh.
1 *Scymnus tenebrosus* Muls. (?).
1 *Lathropus vernalis* Lec.
1 *Tenebrioides corticalis* Melsh.
1 *Cyphon collaris* Guer.
1 *Cyphon variabilis* Thunb.
6 *Deltometopus amoenicornis* Say.
1 *Fornax calceatus* Say.
4 *Entomophthalmus rufiolus* Lec.
8 *Elater obliquus* Say.
4 *Melanotus trapezoideus* Lec.
2 *Melanotus communis* Gyll.
4 *Cinyra gracilipes* Melsh.
3 *Chrysobothris sexsignata* Say.
6 *Ellychnia corrusca* Linn.
1 *Cymatodera bicolor* Say.
1 *Helodes thoracica* Guér.
2 *Hydnocera unifasciata* Say.
2 *Hydnocera pallipennis* Say.
1 *Hydnocera verticalis* Say.
2 *Catorama* (*Hemiptychus*) *nigritulum* Lec.
1 *Dorcatoma dresdensis* Hbst.
1 *Cis fuscipes* Mellié.
2 *Callidium aereum* Newm.
1 *Heterachtes quadrimaculatus* Newm.
4 *Xanthonia* 10-*notata* Say.
2 *Dibolia borealis* Chev.
1 *Platydema subcostatum* Lap.
1 *Mordellistena trifasciata* Say.
1 *Abstrulia tessellata* Melsh.
1 *Canifa pusilla* Hald.
1 *Pandeletejus hilaris* Hbst.
1 *Otidocephalus chevrolati* Horn.
1 *Dryophthorus corticalis* Say.
1 *Pityophthorus minutissimus* Linn.
1 *Xyleborus* sp.

Photographing Insects under Magnification.

In *Camera Craft* for October, 1914, there appeared an article by Samuel B. Doten, Entomologist and Director of the Nevada Agricultural Experiment Station, entitled, "A Cold Flame for Zoological Work."

Judging from the title, it is not suggestive of an article that would interest entomologists, but it is, however, the results of experiments conducted in the entomological field and is excellently illustrated by half tones from photographs. These represent a few insects in their natural attitudes, and well defined, especially aphids, photographed under magnification illuminated by the intense light of fused silver wire. The paper treats mainly of sources of proper lighting without heat for photographing life under magnification. It is evident that such illumination must not have a high temperature. Entomologists desiring photographs of insects showing their natural attitudes will probably find Dr. Doten's methods of value. He promises further details in the near future should his readers be interested sufficiently to ask for them.—E. T. C., Jr.

Notes on Some Species of Tischeria, with Descriptions of New Species (Lep.).

By ANNETTE F. BRAUN, Cincinnati, Ohio.

Under the names *Tischeria badiiella* and *T. purinosella* respectively, Chambers described two species of *Tischeria*, both of them miners in leaves of white oak (Cin. Quart. Jn. Sci., II, 109, 110, 1875). In regard to the mine of the former species, he says that it is usually placed near or at the edge of the leaf, is whitish while fresh, becoming yellowish when dry. The mine of the latter species he does not characterize.

Specimens of the only species having a mine of this appearance that I have bred in the region of Cincinnati combine the characteristics of the published descriptions of both species. *Badiiella* seems to differ from *purinosella* chiefly by the absence of the usual conspicuous dusting in the apex of the wing; such specimens are rather rare in a bred series. On the other hand, almost all of the specimens have the line of dusting along the basal half of the dorsal margin. All of the specimens, however, agree much more closely with the description of *T. albostraminea* Wlsm. (Proc. U. S. N. M., XXXIII, 224, 1907), whose mine on oak has been described by Mr. Busck (Proc. Ent. Soc. Wash., XI, 103, 1909). The small costal spot at two-thirds, which is not mentioned by Chambers in either description, is without exception present, even in the palest specimens.

The species should therefore be known as *Tischeria badiiella* Chambers; *T. purinosella* and *T. albostraminea* will then sink as synonyms.

Tischeria immaculata n. sp.

Head, including tuft and palpi, gray, tips of the scales white; antennae gray.

Thorax and fore wings gray, with the tips of the scales white, so that the wing presents a uniformly speckled appearance under a lens. There is no indication of other markings. Hind wings and cilia gray.

Legs gray, scales white-tipped as on the fore wings, except the hind tibiæ and tarsi, which are pale yellowish. Abdomen yellowish, especially posteriorly.

Expanse: 7.5-8 mm.

Twelve specimens, Loma Linda, California. The larva is a miner on *Prunus ilicifolia,* a shrub with small, thick, spiny-edged leaves. The mine is visible on the upper side of the leaf as a short elongate ridge, the loosened epidermis being raised slightly above the general surface of the leaf. The entire length of the mine is not greater than 1 cm., its breadth 2 or 3 mm. At emergence the pupa is thrust through the lower epidermis. Mines received from Mr. G. R. Pilate in April; imagos at the end of the same month.

Types in my collection.

In addition to the well known *Tischeria ceanothi* Wlsm., there are at least two species of *Tischeria* mining on other species of *Ceanothus* in California. One of these resembles *T. ceanothi* very closely, but seems to be entitled to specific rank. The other approaches more closely to the type of the oak-feeding species in coloration and markings.

Tischeria ambigua n. sp.

Entire head, palpi and antennae dark gray, scales tipped with white. Tuft on basal segment of antennae unusually long.

Fore wings gray, scales white-tipped; base of wing darkened especially on the costa; a darker transverse tornal spot, sometimes reaching half-way across the wing. In general, there is a paler area extending along the middle of the wing from base to two-thirds. Hind wings and cilia gray, faintly tinged with ocherous.

Fore and middle legs dark gray; hind legs yellowish, with the tarsal segments dark-tipped. Abdomen becoming yellowish posteriorly.

Expanse: 10.5-11 mm.

Three specimens, Fredalba, San Bernardino County, California. The larva is a miner on a small, thick-leaved species of *Ceanothus.* The mine begins as a short linear tract perpendicular to the midrib, soon bending sharply on itself, and broadening into a short, elongate blotch, which is deep yellow in color. The pupa is thrust through the lower epidermis at emergence. Mines and imagos in the latter part of August.

Types in my collection.

In addition to the slight differences in color and markings, viz., the darker head and absence of brown in the ground color, individuals of this species are of considerably larger size than those of *T. ceanothi,* of which the larger specimens do not exceed 9 mm. in expanse.

Tischeria bifurcata n. sp.

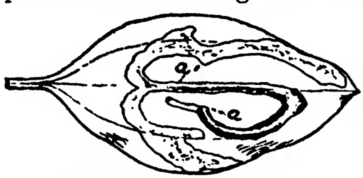
Face, palpi and antennae very pale yellow, tuft on head usually deeper yellow, occasionally with a few fuscous scales.

Ground color of the fore wings variable; sometimes the wing is very pale yellow at the base, shading to deep yellow toward the apex; at the other extreme are specimens in which the deeper color extends to the base of the wing; such specimens have the apex of the wing much darkened, the color becoming almost orange. Base of the costa fuscous; sometimes merely the extreme edge of the costa is dark, sometimes there is a streak of scattered fuscous scales along the costa from the base to the middle of the wing. There are scattered darker-tipped scales. These are more plentiful near the costa, where they form the dark streak just referred to, and in the apex of the wing. Hind wings and cilia pale yellow.

Legs pale yellow, anterior pair shaded with fuscous externally. Abdomen yellow, shading to fuscous posteriorly.

Expanse: 8 mm.

Twelve specimens, Fredalba, San Bernardino County, California. The larva is a miner in leaves of a species of *Ceanothus*. The work of the larva is very characteristic, differing in appearance from that of the other species, though retaining the general characters of the genus. The mine starts as a linear tract, curving upwards and meeting the midrib in the upper



Mine of *Tischeria bifurcata*.

third of the leaf, whence it follows the course of the midrib downwards to a point about one-third from the base of the leaf, where it branches to either side. In these branches the greater part of the parenchyma is consumed, so that the mine is somewhat transparent and the epidermis is brownish discolored in spots. From *a* to *a'*, as shown in the figure, the mine is lined with silk and the lower epidermis projects as a ridge on the underside, forming a tube into which the larva retreats when disturbed. Pupation takes place in the part of this tube which lies over the midrib; the pupa is thrust out at the upper end on the underside of the leaf at emergence.

The mines were collected by Mr. G. R. Pilate in the middle of August; the imagos appeared August 31 to September 2.

Types in my collection.

Heteroptera in Beach Drift.

By J. R. DE LA TORRE BUENO, White Plains, New York.

In 1904, Professor James G. Needham published a paper on beetles in beach drift,* setting forth a remarkable occurrence of *Lachnosterna* on the shores of Lake Michigan, where they were cast up by wind and tide in the summer of that year. This is the only formal paper bearing on this subject I am acquainted with, although allusions to beach collecting and to spring flights of insects which take them over waters, drowning or overcoming them, to become the prey of insectivorous animals of various kinds and the specimens of entomologists, are not uncommon in the literature. Of Heteroptera, I have no knowledge of other than stray records of species found on the tide line.

Apart from this being a ready means of collecting, Heteroptera in beach drift are worthy of notice and indeed are of great interest, since at such times the winged form of normally apterous species may be found, making it possible to secure these very desirable rarities, and, of course, in many instances, perfecting our knowledge of certain species. It is notable also in that many cryptic species emerge from their ordinary hiding places and are thus seen to be of much greater abundance than one might judge from the stray individuals taken here and there.

Another peculiarity is that there is seemingly no fixed atmospheric condition making for these flights, which, so far as observed, are not nuptial in character in the Heteroptera. Those that I have personally secured have been found in July and October, as noted further on. The wind, of course, has to be in particular directions as regards the water. In bodies of fresh water, the numbers found must be less than in salt water, as the top-feeding fishes abound in the former and they must eat very many.

The importance of this form of collecting, apart from its ecological significance, is perhaps best illustrated by the cap-

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*Beetle Drift on Lake Michigan, Canadian Entomologist, xxxvi, pp. 294-6.

ture at West Point, New York, by Col. Wirt Robinson, of four specimens of the extremely rare bug *Acantholoma denticulata* Stal, known heretofore only from the type locality and type specimen from Illinois, and recorded only twice since from other parts of the country. Another find on the Long Island beaches is *Leptoglossus magnoliae* Heid., taken by Mr. F. M. Schott on the tide line at Rockaway, the first record from north of Washington, D. C.

At Point Pleasant, New Jersey, on July 27, 1905, a little girl brought me a small can full of insects cast up by the waves of the Atlantic on the beach—there were Diptera, Hymenoptera, Coleoptera, all much the worse for wear, and among them the following Heteroptera: *Mineus strigipes* H. S., *Apateticus* sp., *Euschistus variolarius* P. B. and *E. ictericus* Linné. This last was not uncommon in the sedges in the salt marshes about the beach.

On August 8, although I had watched for a repetition of the phenomenon from day to day in vain till that date, I secured one *Arilus cristatus* Linné, drowned.

Four years later (1909), I was on the beach at Rockaway, Long Island, on September 12, for the specific purpose of getting Heteroptera in the drift. Only six species were collected in the course of the day, which was rather cold and windy. Of these, *Apateticus cynicus* Say was the most abundant, no less than 13 being secured. The others were *Apateticus serieventris* Uhler, also common; *Amaurochrous cinctipes* Say, two only; *Euschistus euschistoides* Voll., and *E. variolarius* P. B., both very common, and *Ligyrocoris diffusus* Uhler, one specimen.

While the insects were pretty wet and draggled, they were not dead, and as soon as they began to get dry they showed signs of getting ready for flight.

Another four years passed before it was possible for me to secure some more beach drift Heteroptera, although I had in the meantime been on the beaches at times supposed to be propitious for this form of collecting. While spending a July day (the 19th) on Fire Island Beach, at Smith's Point, on the long sand dunes separating the ocean from Great South Bay, the

opportunity presented itself for securing some more drift bugs. As I recollect, the day was very windy, but it was warm in the sun, with clouds from time to time making chilly moments. On hands and knees I crawled about a mile up and down the beach, along the line where the receding waves left a narrow windrow of insects for about that distance. In passing, I may note that the places of abundance of drift insects in the ocean beaches hereabout are very restricted as to length, sometimes about a mile, as in this instance; at other times only some hundreds of feet. In my own experience I have not seen longer stretches, but others may have done so.

On this occasion, the Heteroptera predominated over all the other groups put together, the most abundant species being the Myodochid *Eremocoris ferus* Say, of which some twenty were found, some perfect, others much dilapidated by the action of the waves. *Apateticus maculiventris* and *Euschistus variolarius* were abundant as usual, closely followed by the recently decribed *Corizus hirtus* Bueno, of which some nine were secured. The rather rare *Pseudocnemodus canadensis* Prov. and the infrequent *Aradus uniformis* Heidemann were not uncommon, there being four of the long-winged form of the latter and five of the former, these being somewhat battered. The normally apterous species, *Gerris remigis* Say and an unknown Tingid were secured, one of each species. The other forms found were:

Apateticus cynicus Say, three specimens.
A. bracteatus Fitch, only one.
A. maculiventris Say, abundant.
Perilloides circumcinctus Stal, one.
Mormidea lugens Fabr., another common species, not taken or counted.
Euschistus variolarius P. B., the same.
E. politus Uhler, seven specimens.
Coenus delius Say, only one specimen found.
Thyanta custator Fábr., three.
Th. calceata Say, two.
Nezara pennsylvanica, P. B., a very rare species, one.
Schirus cinctus P. B., one only, very lively, and digging into the sand for shelter.
Alydus eurinus Say, and
Megalotomus quinquespinosus Say, one of each.
Corizus lateralis Say, two specimens.
C. hirtus Bueno, nine, as already noted, all long-winged.
Lygaeus kalmii Stal, three.

Nysius minutus Uhler, one.
Pseudocnemodus canadensis Provancher, four long-winged.
Emblethis vicarius Horv., two.
Eremocoris ferus Say, as noted.
Aradus uniformis Heid., five; two or three with mites on the underside.
A. abbas Bergr., one.
Neuroctenus simplex Uhler, one.
Gerris remigis Say, one winged, very rare form.
Gerris marginatus Say, two.
Reduviolus ferus Linné, one.
Zelus socius Uhler, one.
Acanthia humilis Say, one very lively specimen of this small species was found; possibly others had got away.
The truly aquatic Hemiptera had only two representatives, one specimen each of
Corixa interrupta Say, and
Corixa pectenata Abbott.

In addition to the Tingid mentioned, there were two specimens of a Myodochid that I have been as yet unable to place to my satisfaction.

The following year, 1914, I spent a couple of hours on the beach at Arverne, in about the same part of Long Island, on the 3d of October. Away from the water, the weather was warm, and even sultry, but down on the beach it was raw and windy, with a heavy sea breeze. The Hemiptera found were scattered along some hundreds of yards of beach and were quite active for all their sea bath. The most abundant species was *Amnestus spinifrons,* of which seven specimens were secured, the next being *Brochymena quadripustulata,* which yielded six.

This is the total list found, which, while small in numbers, was interesting as to species and condition.

Apateticus serieventris Uhler, three.
Trichopepla semivittata Say, one.
Mormidea lugens, Fabr., one.
Euschistus variolarius P. B., one.
Hymenarcys nervosa Say, one.
Nezara hilaris Say, one.
Brochymena quadripustulata, Fabr., six.
Amnestus spinifrons Say, seven.
Amnestus pusillus Uhler, three.
Chariesterus antennator Fabr., two, which were covered beneath with a heavy farinose pruinosity.
Nysius ericae Schill., one.
Ischnorhynchus geminatus Say one.
Crophius disconotus Say, one (a rather rare species).

This completes the tale of my own collecting on the neighboring salt waters. Last year, however, it was my good fortune to come into possession through the courtesy of Mr. John

D. Sherman, Jr., who collected the specimens, of a small lot of Heteroptera found on the shores of the Lake at Marquette, Michigan, in July. The fresh water aquatic forms, ordinarily abundant in bodies of still water, were but slightly represented, there being only one *Belostoma fluminea* Say, one *Arctocorisa nitida,* several *Gerris rufoscutellatus,* and one *G. remigis.* Of the land forms, the most abundant were *Thyreocoris unicolor,* represented by about twenty or more specimens, *Sehirus cinctus* in about the same number, and to judge from the fragments, over thirty *Galeatus peckhami,* another species known only from the type, and some one or two other specimens in collections, and therefore a most desirable form from every point of view. The full list of the species is:

Perilloides exaptus Say, two.
Pentatoma persimilis Horvath, one.
Comopepla lintneriana Kirk., one.
Banasa dimidiata Say, two; apparently not yet known from Michigan.
Sehirus cinctus P. B.
Thyreocoris unicolor P. B.
Alydus conspersus Mont., two.
Lygaeus bicrucis Say, two.
Lygaeus kalmii Stal, one.
Nysius ericae Schill., one.
Cymus discors Horv., two; as this species dwells in cat-tails, it is not surprising to find it in drift.
Geocoris bullatus Say, one.
Sphragisticus nebulosus Fall., two.
Eremocoris ferus Say, one.
Corythuca pergandei Heid., one.
Galeatus peckhami Ashm.
Orthostira lillias Bueno MS., one long winged; a rare form.
Reduviolus subcoleoptratus Kirby, two of the very rare macropterous form, of which in thirteen years' collecting I have been able to secure only two, and of which there are not a dozen known specimens all told in collections.
Gerris remigis Say, apterous form, therefore a stray.
Gerris rufoscutellatus Latr.
Belostoma fluminea Say.
Arctocorisa nitida Fabr.

Eliminating duplications, there was a total of 66 species found under these conditions, 22 in the lake and 49 on the ocean beach, five being found in both situations, these being *Sehirus cinctus, Nysius ericae, Eremocoris ferus, Lygaeus kalmii* and *Gerris remigis.* The seashore specimen, however, was not a shipwrecked navigator, but a true flier, as noted. These species totalled 300 specimens approximately, or over, as no count was kept of the common forms. The families were represented as follows, in the order of the number of species, which is nearly the order of their abundance:

Cimicidae, 30 species and 183 specimens, 5 species totalling about 100 specimens.

Myodochidae, 14 species, over 20 specimens of one of them, and a total of over 46 specimens.

Coreidae, 7 species and 18 specimens.

Tingids, 4 species and 35 specimens, some 32 being *Galeatus*.

Reduviidae, 4 species and 5 specimens.

Aradidae, 3 species and 8 specimens.

Aquatics, all families, 9 species and 16 specimens, of which nearly half were *Gerris rufoscutellatus*.

Miridae were not collected, as they were by far too dilapidated to be of much service.

The relative abundance of the families is what should be expected, in view of the fact that the Cimicidae are abundant in numbers and strong fliers, and that the Myodochidae, next to the Miridae, are the largest of the Heteropterous families and most abundant as to individuals. No significance is to be attached to the presence of water-bugs in the lake drift, as these were probably drowned by their own element. Those on the ocean shore, however, had got there by flight, and at the time they were taken were quite lively.

This is in the nature of a preliminary report, and it is hoped that later study may be more enlightening as to the precise conditions that determine these flights and their significance, as well as the season of the year when they are most likely to take place.

Ecto or Endoparasitism? A plea for Greater Definiteness in the Citation of Host Data in the Parasitic Hymenoptera.

There is a strong tendency among students of parasitic Hymenoptera and economic entomologists to ignore the matter of the exact relation of the parasitic larva to the body of the host, i. e., whether it is ecto- or endoparasitic. Many authors, even though they themselves rear the parasites, are content to record merely "bred from," "reared from," or "parasitic upon" such and such a host. Quite often, it is true, one can make a plausible guess from a knowledge of closely-related forms, but this method cannot be universally applied with safety.

The economic importance and the purely scientific value of bionomical studies in the parasitic Hymenoptera demand an ever-increasing exactness of observation and record. Those who publish on material which they have reared are usually in a position to state whether the parasites are external or internal in habit. If this information is given, the value of their contributions will be increased.—C. H. Richardson, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., JUNE, 1915.

Incomplete Titles.

A graduate student in zoology in one of the Universities of the eastern States was once heard to say that her professor had told her that a candidate for the doctor's degree ought to know the names of all the principal genera of the animal kingdom. The reader of these lines is receiving this remark at third hand, so that he is entitled to doubt either the accuracy of the reporters or the justness of the original. There are, however, even in the year 1915, authors of entomological papers who tacitly assume that editors and readers of journals to which they send their contributions really do possess the astounding lexicographical requirement which terrified the fair graduate. The entomological author of *The Butterfly Hunters in the Caribees* estimated that Dr. Joseph Leidy (with whom he conversed on the subject), knew "3000 geological and zoological names," and tells us, without giving his authority, that Cuvier and Louis Agassiz could promptly give the names "of over 5000 animals," and that Dr. Asa Gray knew quite 8000 plants by name. The Index to Professor John B. Smith's 1909 list of the Insects of New Jersey contains about 4250 names of families and genera. Are there any who can place from memory all the generic names of this list in their proper families or even orders? Yet the insect fauna of New Jersey is but a small part of the total fauna of the world. After all, the speaker referred to in our opening sentence may have thought only of the names of Linnean genera.

This relief does not help out with the authors of 1915, and to them we put the question: Is it fair to expect the readers of a journal publishing on insects of all groups to know what *Tephrochlamys* is without adding any explanation? If an explanatory abbreviation *is* to be placed after the title, is it fair to throw the burden of supplying it on the editor? If he publishes your paper without any such explanatory abbreviation, isn't it poor editing? Why should his time, quite as valuable as *yours,* dear author, be consumed with supplying your deficiencies? Would he not be justified in rejecting your contribution on this ground?

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Entomologists in the War Zone.

A letter from Dr. Karl Jordan, dated Tring, April 8, 1915, to Dr. Henry Skinner, states that Dr. Walther Horn, Dr. H. Schouteden and M. Guillaume Severin are well and at their posts in their respective museums (Berlin-Dahlem, Tervueren and Brussels.) The writer had been unable to get into communication with Dr. Anton Handlirsch in Vienna.

A Mistake of a Butterfly (Lep.).

Mr. E. E. Barnard writes in *Nature*, April 15, 1915, that, while looking at a bright-colored "eye" of a peacock's feather in the band of a man's hat, he saw a butterfly floating above. It suddenly alighted on the "eye" and apparently began trying to extract food from it. After several minutes it flew away as if satisfied that it had made a mistake. It was evidently guided entirely by sight in seeking food in this case.

Cerambycid in Bedstead (Col.).

Recently one of my students brought in a larva which he found working in the bedstead in his room. The larva had bored into the rail, apparently from the inside, and was still working when found. It was evidently a Cerambycid, but in order to determine the species, the specimen was sent to Dr. L. O. Howard at Washington, who writes that Mr. F. C. Craighead, Specialist of Forest Insects, identified it as the larva of *Eburia 4-geminata* Say. This insect commonly feeds in seasoned oak, ash, hickory, etc., but the interesting question about this particular case is when did the larva get into the bed rail and how long has it been there?

In tracing the history of the bed, I find that the present owner purchased it in LaFayette nearly twenty years ago, and it has been in constant use since that time. Another board in the bedstead shows unmistakable signs of having been "worm eaten" when put into the bed, and that would seem to indicate that these eggs were laid before the lumber was worked up. If so, this larva is at least twenty years old. Dr. Lintner makes mention, in his Fourth Report, of instances where members of this family have been known to escape from furniture many years after the furniture was made up, and while it is generally known that the absence of moisture and lack of air, caused by polishing and varnishing of the lumber, will retard the rapidity of development of the larvae of borers to a certain extent, it hardly seems possible that the larval period would be prolonged for eighteen or twenty years, as in this case; and yet I cannot account for it in any other way, as the excavations all indicate that they were made from the inside. This species is quite rare in Indiana, and is the only species of *Eburia* found in the State.—J. Troop, Purdue University, LaFayette, Indiana.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—The Canadian Entomologist. **22**—Zoologischer Anzeiger, Leipzig. **34**—Proceedings, Iowa Academy of Sciences, Des Moines. **66**—Die Naturwissenschaften, Berlin. **81**—Biologisches Centralblatt, Erlangen. **97**—Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **143**—Ohio Naturalist. **161**—Proceedings, The Biological Society of Washington. **166**—Internationale Entomologische Zeitschrift, Guben. **180**—Annals, Entomological Society of America. **189**—Journal of Entomology and Zoology, Claremont, Calif. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. **204**—New York State Museum, Albany. **313**—Bulletin of Entomological Research, London. **344**—U. S. Department of Agriculture, Washington, D. C. **359**—Connecticut Agricultural Experiment Station, New Haven. **394**—Parasitology, Cambridge, England. **456**—Kosmos, Handweiser fur Naturfreunde, Stuttgart. **490**—The Journal of Parasitology, Urbana, Illinois. **504**—Scientific Proceedings, Royal Dublin Society. **505**—Agricultural News, Barbados. **506**—Bulletin, Torrey Botanical Club.

GENERAL SUBJECT. **Britton, W. E.**—Report (14) of the state entomologist of Connecticut, **359,** An. Rpt., 1914, 113-198. **Crampton, G. C.**—Suggestions for the standardization of technical terms in entomology, **180,** viii, 74-8. **Felt, E. P.**—Report (29) of the state entomologist on injurious and other insects of the state of New York, **204,** Bul. 175. **Forbes, S. A.**—The ecological foundations of applied entomology, **180,** viii, 1-19. **Grossenbacher, J. C.** Medullary spots and their cause [Cause, insect mining], **506,** xlii, 227-39. **Lovell, J. H.**—Insects captured by the Thomisidae, **4,** 1915, 115-6. **Osborn, H.**—Entomological work in Ohio, **143,** xv, 453-62. **Treherne, R. C.**—Notes of economic interest from British Columbia, **4,** 1915, 101-4.

PHYSIOLOGY AND EMBRYOLOGY. Strindberg, H.—Zur eifurchung der Hymenopteren nebst einigen damit zusammenhangenden fragen, **22**, xlv, 248-60. **Woolsey, C. I.**—Linkage of chromosomes correlated with reduction in numbers among the species of a genus, also within a species of the Locustidae, **198**, xxviii, 163-86.

MEDICAL. Kellogg, V. L.—Spider poison, **490**, i, 107-12.

ARACHNIDA, ETC. Nuttall, G. H. F.—Observations on the biology of Ixodidae; Artificial parthenogenesis in ticks, **394**, vii, 408-56; 457-61.

NEUROPTERA, ETC. Foster & Jones—The life history and habits of the pear thrips in California, **344**, Bul. 173. **Lloyd, J. T.**—Notes on Ithytrichia confusa, **4**, 1915, 117-21. **Noyes, A. A.**—The proventriculus of a Hydropsyche larva, **189**, vii, 34-44. **Peterson, A.**—Morphological studies on the head and mouth parts of the Thysanoptera, **180**, viii, 20-66. **Quiel, G.**—Anatomische untersuchungen an Collembolen, **97**, cxiii, 113-64.

HEMIPTERA. Nanayama, S.—Notes on the life history and habits of the rose scale, Aulacaspis rosae, **189**, vii, 45-54. **Stafford, E. W.**—Studies in Diaspinine pygidia, **180**, viii, 67-73.

Baker, A. C.—The woolly apple aphis, **344**, Of. Secty., Rept. 101.

LEPIDOPTERA. Berry, G. H.—A list of the L. of Linn County, Iowa, **34**, xxi, 279-316. **Braun, A. F.**—Life histories of N. A. Tineina, **4**, 1915, 104-8. **Pellett, F. C.**—Butterflies of chance occurrence in Cass County, Iowa, **34**, xxi, 347-8. **Lindsey, A. W.**—The butterflies of Woodbury County, Iowa, **34**, xxi, 341-46.

Bird, H.—New species and histories in Papaipema [2 new], **4**, 1915, 109-115. **Closs, A.**—Neue aberrationen aus der familie der Sphingidae, **166**, ix, 1.

DIPTERA. Aldrich, J. M.—Results of 25 years' collecting in Tachinidae with notes on some common species, **180**, viii, 79-84. **Alexander, C. P.**—The biology of the N. A. crane flies, III. The genus Ula, **189**, vii, 1-9. **Carpenter & Hewitt**—The reproductive organs and the newly hatched larva of the warble-fly (Hypoderma), **504**, xiv, 268-89. **Coutant, A. F.**—The habits, life-history, and structure of a blood-sucking muscid larva (Protocalliphora azurea), **490**, i, 134-50. **Davidson, W. M.**—Occurrence of Eumerus (Syrphidae) in California, **4**, 1915, 134-5. **H. A. B.**—A fruit fly attacking papaw fruits, **505**, xiv, 106. **Hadwen, S.**—Warble flies. A further contribution on the biology of Hypoderma lineatum and H. bovis, **394**, vii, 331-8. **Hewitt, T. R.**—The larva and pupa-

rium of the frit-fly, **504**, xiv, 313-16. **Rohrbach, P.**—Zwei ubel des eingeborenenlebens in unseren kolonien, **456**, 1915, 111-3. **Steche, O.**—Die schwimmblasen der buschelmucke, Corethra plumicornis, **66**, xii, 157-60. **Strickland, C.**—The comparative morphology of the Anophelines Nyssomyzomyia ludlowi & N. rossi, **313**, v, 321-4.

Felt, E. P.—A study of gall midges, II. [1 new genus, 3 n. sps.], **204**, Bul. 175, 79-242. **Knab, F.**—Two new sps. of Pipunculus, **161**, xxviii, 83-86. Brauer on generic values in the Muscoidea; The Nemocera not a natural group of D., **180**, viii, 91-2; 93-8. **Townsend, C. H. T.**—On proper generic conceps, **180**, viii, 85-90.

COLEOPTERA. **King, I. N.**—The C. of Henry County, Iowa, **34**, xxi, 317-40. **Kuhne, O.**—Der tracheenverlauf im flugel der koleopterennymphe, **97**, cxii, 692-718. **Prochnow, O.**—Das springen der schnellkaefer, physikalisch betrachtet, **81**, xxxv, 84-93.

Fall, H. C.—The west coast species of Pedilus [11 new names], **189**, vii, 10-31.

Doings of Societies.

Entomological Section, Academy of Natural Sciences of Philadelphia.

Meeting of March 25th, 1915, Mr. Philip Laurent, Director, presiding. Eight persons present. Mr. R. C. Williams was elected a member.

Lepidoptera. -Dr. Calvert communicated some observations he made in Costa Rica on the caudal brush-like appendages of the male of the butterfly *Lycorea atergatis,* exhibited specimens and drawings showing the brushes and explained the manner by which such brushes are exserted.

Diptera.—Mr. Laurent read an account from a newspaper which said that in the early days in Philadelphia the house-flies were so bad on Market or High Street that many business people left it and moved to Chestnut Street, whereby the latter became a business street.

E. T. Cresson, Jr., *Secretary pro tem.*

Feldman Collecting Social.

Meeting of March 17th, 1915, at the home of Dr. Skinner, Glenn Road, Ardmore, Pennsylvania. Eleven members and three visitors were present. President Wenzel in the chair.

Coleoptera.—Dr. Skinner exhibited pieces of board (ash) brought him by a lumber firm, part of what had been supplied for a row of dwellings, and which were riddled by *Lyctus planicollis* LeC., living specimens having been found in the pieces shown. He was told the

wood was kept in a dry kiln for ten days and subjected to a temperature of 120 to 150 degrees. He suggested that all waste should be destroyed and the lumber to be used left in a kiln for a longer period and subjected to as high a temperature as possible. Mr. Wenzel exhibited his collection of *Staphylinus* and allied genera.

Lepidoptera.—Mr. Hornig said that he had had fifty men allowed him to rid the public squares and parks of the egg masses of the tussock moth, which were very numerous this winter. Mentioned one branch about three inches in diameter and about four feet long on which he counted over two hundred egg masses. During January and February he had collected eighty-two buckets of these masses and he had figured on from three to five thousand masses to the bucket and about three hundred eggs to the mass.

Diptera.—Mr. Harbeck exhibited a pair of *Condidea lata* Coq. from White Fish Point, Michigan. Also spoke of a confusion in collections of *Laphria gilva* Linn. with allied species.

Adjourned to the annex.

George M. Greene, *Secretary.*

OBITUARY.

Carl Brunner von Wattenwyl.

Although this famous Orthopterist passed away on the twenty-fourth of August, 1914, at Kirchdorf on the Krems in Upper Austria, news of his death reached America but a few months ago, and this but a brief notice of the close of his long and active life of over ninety-one years. Brunner stands with Saussure as one of the two greatest Orthopterists of his day, as to these two men we owe practically all the groundwork and a vast proportion of the detailed study of the present classification of the order.

Brunner was born at Bern, Switzerland, June 13, 1823, a member of one of the oldest Swiss families, but early in life changed his home to Vienna, where the remainder of his life was largely spent. It seems a remarkable coincidence that the two master minds of systematic Orthopterology should both be of Swiss birth and of old Swiss families. A member of the Aulic Council and the organizer of the telegraph service of Austria, as well as a bearer of the title of "Hofrath," Brunner was a man of distinction aside from the scientific world.

In his earlier years he published a number of contributions on chemical, physical, geological, glaciological and meteorological subjects.

His first important paper on the Orthoptera appeared in 1861, entitled "Orthopterologische Studien—Beiträge zu Darwin's Theorie über die Entstehung der Arten." The first of the remarkable series of monographic studies made by him was published in 1865, "Nouveau Systeme des Blattaires," which remains the basis of the modern classification of the Blattodea. We can only call attention to the more important of his papers, these being monographic studies, which have given the present day student of the group the greater portion of his classificatory system. In addition to these large papers quite a few smaller ones appeared from his pen, the total number published by him being about twenty-seven.

In 1878, the Locustodea (Tettigoniidae of present authors) were first divided by him into families and the family Phaneropteridae monographed, followed, in 1888, by a similar treatment of the Stenopelmatidae and Gryllacridae, in 1891, by Additamenta to the Phaneropteridae and, in 1894, by a study of the Pseudophyllidae. The Acridodea received less attention from him than the katydids, the only monographic paper on that group published being his study of the Proscopidae, in 1890.

In 1882, probably his most exhaustive work appeared, the "Prodromus der Europaischen Orthopteren," which Burr has truly called an "encyclopaedia of the European forms," and which remains, after the lapse of thirty-three years, an indispensable requisite to the worker on Palaearctic Orthoptera.

The rich collections of Orthoptera made in Burma by Fea were placed in Brunner's hands for study, and in reporting on the collection he gave to the entomological world a complete "Révision du Système des Orthoptéres." This is still the basis of our classification of the order and is perhaps the most important single paper published by him. It is an indispensable necessity in the library of the general Orthopterist, although many will not agree with the treatment accorded genera of

their own region or with the character of analytic keys used. In 1906 to 1908, there appeared from the pens of Brunner and Josef Redtenbacher a monumental study entitled, "Die Insektenfamilie Phasmiden." This was the last of the great monographs from the hand of Brunner, and on it he spent years of study. The first section of it appeared when he was eighty-three years of age. In many ways it is evident in this great publication that his grip on the rapidly accumulating literature of the time was not complete, as many species and even genera, as well as much established synonymy and variational data, are ignored, the species and genera often being redescribed. This is, however, frequently the case when the preparation of a paper extends over many years, but it is regrettable that before printing or in the proof these matters were not corrected.

Several more broadly philosophical papers were published by Brunner, his "Observations on the Colours of Insects" being published in German and English in 1897. This paper attempts to classify the systems of insect coloration and is an interesting contribution to a most interesting subject. In 1883, he presented the noteworthy essay, "Ueber hypertelische Nachahmung bei den Orthopteren," in which the author advanced his theory of hypertely, a term given to phenomena not explicable in accord with the accepted theories of development.

The Brunner collection of Orthoptera at Vienna, now, we believe, in the Hofmuseum, is probably the most representative in existence, including as it does many thousands of types, of other authors as well as of Brunner himself, among these specimens being the majority of the Stål types of Phasmidae. By placing his collection at the disposal of his co-workers and in giving them aid and encouragement Brunner rendered great service to the study he loved. Redtenbacher's "Monographie der Conocephaliden," of 1891, would not have been published but for the aid of the Brunner collection.

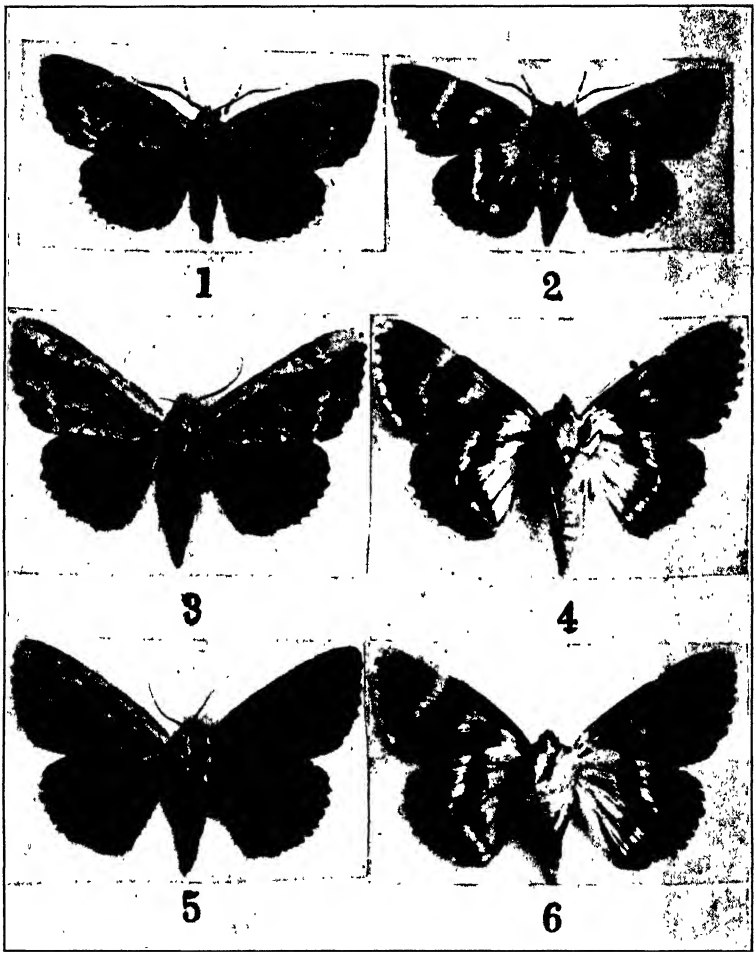
The two criticisms which we have heard voiced and have personally felt regarding Brunner's work can, we think, be ascribed to two tendencies which are quite apparent in it. It is evident he possessed a dogmatic tendency, which is strongly

manifest in his analytic work, much of which, particularly in his "Révision" and in the "Phasmiden," is comparatively crude and unworthy of comparison with certain of his other papers—a lack of appreciation, or a disregard, of the variations of the forms before him, a tendency which sometimes completely nullified the value of pages of tables on account of the use of variable characters for major division criteria. The other tendency noticed is one which, unfortunately, was not peculiar to him. This is a disregard of the work of other authors whose papers may not be within the four walls of the study. Many of our fellow entomologists on this side of the Atlantic complain, with justice, of the lack of consideration their work has received from some of the European workers, particularly Continental students. To Americans the completion of reference files of European journals is a necessity, continuous and never ending, so the silent ignoring of their work, often based on more extensive collections and more carefully compiled data than found in Europe, is exasperating, to say the least. The author remembers quite distinctly receiving a card from Brunner asking for a certain paper, which we might add had been sent unsolicited some years before, and saying there was in Vienna no set of the journal containing it. However, the journal is now and was at that time in the two best known zoological libraries in Vienna.

Beloved by all who knew him and respected by those who appreciate the gigantic pioneer work he did in a previously little studied branch of knowledge—and this largely in the intervals of a busy official life, crowned with years over four score and ten, he passed from us. Truly may we say, "We shall never see his like again," for, owing to the enormous growth of the literature and collections, the day has passed when it was possible for one man to cover in a comprehensive fashion the ever increasing field of even a single branch of entomological knowledge.*

J. A. G. R.

*For a number of the facts given above we wish to express our indebtedness to a short sketch of Brunner von Wattenwyl published by Dr. Malcolm Burr in *The Entomologist's Record and Journal of Variation*, volume XII, pages 5 and 6 (1900).



CATOCALAE—SCHWARZ.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXVI. JULY, 1915. No. 7.

CONTENTS:

Recent Work on Catocalae: A new Variation, Aberration and Correction (Lep.).

By ERNST SCHWARZ, St. Louis, Mo.

(Plate X).

Catocala robinsonii Grote, var. **missouriensis** n. var. (Plate X, figs. 1 and 2).

There occurs a form of *Catocala robinsonii* a little larger than the typical form, in general appearance much like *Catocala angusi* var. *lucetta* in which the black shading on primaries is very similar to that of *lucetta*. In *missouriensis* this shade is even on both sides and not interrupted at the reniform and subreniform, reaching to W of the terminal line and continues from this point posteriorly in a V-shape to below apex. This part of the shade is not as prominent but more suffused.

This shading in *C. angusi* var. *lucetta* is not as even, more or less interrupted by the reniform and subreniform reaching nearly to the lunules 5 and 6. There is also a V-shaped extension above this point, which is of the same intensity as the other part of the shading.

Missouriensis has the fringes on hind wings white, whereas in *lucetta* they are of a dirty gray. The most distinctive characters are to be found on the lower surface of the hind wings and a glance at this will suffice to show that *missouriensis* is identical with the typical form of *robinsonii.*

Exp. 72 mm.

Four specimens of this abstract form were taken in 1913—two males in St. Louis County, Missouri, and one male and one female in Montgomery County, Alabama. Types in collection of George Hosenfeldt and E. Schwarz.

Catocala robinsonii was described by Prof. Grote in 1872 and it is surprising that such an extremely marked form could escape the detection of the collectors for such a long period. *Robinsonii* is one of the more common species of the genus and is remarkably constant in color and markings, in fact so much so that when a collector ever captures the var. *curvata,* he feels himself specially favored. *Curvata* is the form with a heavy basal dash and a curved shade from medium shade over reniform to beneath apex.

There also occurs an aberration in *Catocala angusi* var. *lucetta* (Plate X, Figures 3 and 4), with white fringes on hind wings which could, therefore, easily be mistaken for the above. The illustrations show the great similarity of the two. Here again the lower side guides us in determining their specific relation. These two forms are the most similar in the whole genus, as far as the upper surface is concerned. Two specimens were taken, one male and one female at Meramec Highlands, St. Louis County, Missouri.

Angusi var. *edna* (Plate X, Figures 5 and 6), proves to be the female form in this location. Out of 400 *angusi* taken thirty-eight were females all of the *edna* type, but none of the males possess the *edna* markings—this is the form with a heavy basal dash reaching to the reniform.

EXPLANATION OF PLATE X.

Figs. 1 and 2, *Catocala robinsonii* n. var. *missouriensis.*
Figs. 3 and 4, Aberration of *C. angusi* var. *lucetta.*
Figs. 5 and 6, *C, angusi* var. *edna.*

A new Halictine Bee from the Northern United States (Hym.).

By Marion Durbin Ellis, Boulder, Colorado.

There is a rather common *Halictus* of the northern and eastern States which has generally passed as *H. connexus* Cresson. Genuine *H. connexus* from Texas, received through the kindness of Mr. J. C. Crawford, proves to be distinct, so it becomes necessary to describe the so-called *H. connexus* as new.

Halictus subconnexus n. sp.

♀.—Length, 6 mm.; head and thorax blue green; abdomen black, with distinct metallic green reflections, the broad outer margin of each segment brown, shading to testaceous at the edge.

Facial quadrangle almost if not quite as broad as long, a little narrower below than above; vertex closely punctured; lateral areas of the face somewhat shiny, the punctures a little more crowded along the inner margin of the eyes than about the base of the antennae; supraclypeal area and clypeus more or less brassy, sharply lineolate, and with fine, scattered punctures; distal half of the clypeus shining black, margined with rather long, golden yellow hair; flagellum dark brown, almost black; cheeks not large or prominent.

Thorax with coarse, more or less confluent punctures on the sides; mesonotum rather broad, its surface finely but sharply lineolate, and with very fine, widely separated punctures, which are closer, but still not crowded, along the posterior margin; median groove distinct, parapsidal grooves short and somewhat indistinct; scutellum distinctly two-parted, the punctures crowded around its margins and along the median groove; truncation of the metathorax not entirely surrounded by the low sharp rim, which is well developed on either side near the base; basal area of the metathorax distinctly concave in the middle, the outer margin elevated into a short rounded rim, which truncates the middle third of the strong, simple but crooked plicae; plicae at the sides long and continued well onto the full, rounded, lateral areas, where they seem to converge toward the dorsal end of the rim at the base of the truncation; tegulae brown.

Wings hyaline, nervures and stigma testaceous, width of the second submarginal cell not more than one and one-third in the third.

Legs dark brown, tarsi reddish brown, hind spur of the hind tibia with four teeth.

Abdomen broad and shiny, the disc of the first segment impunctate; pubescence pale ochraceous, rather abundant on the legs, the post-scutellum, the ventral surface of all, and the dorsal surface of the last

three abdominal segments, rather scanty on the rest of the thorax and head.

Hab.—Milwaukee, Wisconsin, one (=type) May 29, 1903, and one (cotype) April 27, 1905 (*S. Graenicher*). Forest Hills, Massachusetts, May 11, 1912 (*W. M. Wheeler*). Also from Garrison, New York (*Eleth Cattell*) and Niagara, New York, June, 1904 (*Cockerell*).

The specimens from Massachusetts were a little larger and more robust, and had the stigma and nervures a little darker than those from Wisconsin.

The males of this species and of *H. connexus* Cresson from Texas were examined and compared; each resembles the female of the respective species except for such differences as are due to sex. The males of the two species differ from one another in the same characters as the females.

Halictus subconnexus rohweri n. subsp.

Two specimens from Newington, Fairfax Co., Virginia, May 30, 1911 (*S. A. Rohwer*), appear to represent a distinct subspecies. They differ from the typical form mainly as follows: punctures on the disc of the mesonotum a little closer, although quite as fine as in the type; along the lateral and posterior margins of the mesonotum the punctures are closely crowded, and this is especially apparent at the posterior lateral angle, hindermost end of the parapsidal groove; wings distinctly brownish although translucent, stigma and nervures very dark testaceous; truncation of the metathorax sharper and broader with a low sharp lateral rim extending almost to the dorsal margin.

The group of species to which *H. connexus* Cresson and *H. subconnexus* Ellis belong is characterized by the sculpture of the metathorax and the large size of most of its species. The plicae on the basal area of the metathorax are usually very strong. The basal area of the metathorax has a short, sharp rim which truncates its middle plicae but not the more lateral ones, and the truncation of the metathorax is more or less completely bounded by a low sharp rim. In the following key to this group the species are arranged in a series according to the coarseness of the punctures on the mesonotum.

A. Punctures of the mesonotum coarse or rather coarse.

B. Punctures very deep and coarse, wings somewhat brownish, tegulae not punctured.

C. Tibiae and tarsi rather light brown, wings very slightly brownish; sides of all the abdominal segments, except the first, with triangular patches of short, buffy hair; 6.8 mm. Nebraska .... *H. bruneri* Crawford

CC. Legs black; wings distinctly brown; discs of abdominal segments 3 to 5 and sides of 2 with thin yellowish-white pubescence; 7 mm. Widely distributed. *H. cressoni* Robertson

BB. Punctures only moderately coarse; wings not brownish.

D. Facial quadrangle almost square; tegulae with fine scattered punctures, not making the surface opaque; wings ample, hyaline, stigma and nervures dilute brown; 7.5 mm. Eastern States. .... *H. nymphaearum* Robertson

DD. Facial quadrangle longer than broad, distinctly narrowed below; tegulae impunctate; wings more or less milky white, stigma and nervures testaceous; 5 to 6.5 mm. Widely distributed. .... *H. albipennis* Robertson

AA. Punctures of the mesonotum fine and scattered; facial quadrangle very little if at all longer than broad.

E. Abdomen without metallic reflections; mesonotum shiny, or with but very fine lineolations.

F. Facial quadrangle broader than long, clypeus short, scarcely reaching below the eyes; mesonotum shiny, the punctures fine but not widely separated; tegulae rufo-testaceous; wings hyaline, the nervures and stigma pale testaceous; abdomen dark brown with short grayish pubescence; 7.5 mm. Texas. *H. connexus* Cresson

FF. Facial quadrangle almost square, clypeus produced about two-thirds of its length below the eyes; mesonotum shiny, the lineolations very fine or absent; punctures a little closer than in *H. subconnexus* Ellis but finer than in any other species of the entire group; abdomen black, shiny and glabrous; wings slightly brownish, stigma and nervures reddish brown; 7 mm. Wisconsin. ...... *H. nigroviridis* Graenicher

EE. Abdomen greenish or with very strong metallic reflections; mesonotum finely and sharply lineolate, with very fine and widely separated punctures; the last three abdominal segments covered with a thin ochraceous pubescence; tegulae brown.

G. Wings hyaline, stigma and nervures testaceous; 6 mm. Widely distributed. .... *H. subconnexus* Ellis

GG. Wings brownish; 6.5 mm. Virginia. *H. subconnexus rohweri* Ellis

The specimens upon which this paper is based are in the collection of Professor T. D. A. Cockerell, to whom the writer is indebted for them and also for direction and help in this work.

Two new Silphids (Col.).

By (the late) FREDERICK BLANCHARD.

The two new species of *Choleva* in the Horn Collection bearing my Mss. names of *gratiosa* and ***horniana,*** are separated as follows:

Thorax and elytra coarctate; antennae with joints four and five subquadrate, fourth a little longer, sixth slightly wider than long, longer than the eighth, which is short transverse; male hind trochanters toothed; fifth ventral female entire. *clavicornis* Lec.

Sides of thorax and elytra nearly continuous; antennae with joints four to six transverse, gradually wider, sixth equal to eighth; fifth ventral of the female emarginate at middle of apex; hind trochanters simple in the male. Tyngsboro, Massachusetts, V. 19. **horniana** n. sp.

Gratiosa and *alsiosa* have the antennae longer than in the other species, third joint longer than the second, fourth as long as second; fifth ventral female entire.

Eighth joint of antennae longer, equal to the sixth or nearly so; anterior tibiae of male more slender, not curved or sinuate within; tarsi narrow in the same sex; elytra paler. Rangeley Lake, Maine, Aug. 1st. **gratiosa** n. sp.

Eighth joint of antennae very short. anterior tibiae of male stout, curved; front tarsi broadly dilated; first joint of middle tarsi wider; color at maturity piceous or black. *alsiosa* Horn.

[The above is an extract from a letter in reply to a request for information pertaining to these species.

The occurrence here at Chestnut Hill, Philadelphia, Pennsylvania, of both these *Silphids* and their incorporation under the manuscript names in a list of the Coleoptera of Pennsylvania soon to be published, makes it advisable to place the above descriptions on record.—CHAS. LIEBECK.]

Studies on Costa Rican Odonata.

VI. The Waterfall-Dwellers: The Transformation, External Features and Attached Diatoms of Thaumatoneura Larva.

By PHILIP P. CALVERT, PH.D., University of Pennsylvania, Philadelphia, Pa.

(Plate XI)

In number V* of these Studies we have described the adults of *Thaumatoneura* and some of their habits. While we observed motions on the part of females which, by analogy, we interpreted as those of oviposition, we were never able to detect the eggs or to obtain the young larvae from pieces of roots and of moss in which we supposed eggs to have been placed. We were more successful with older larvae. On June 26, 1909, a few were found in among the roots that hung in front of the rock of the farther, or lower, waterfall at Juan Viñas, where they were constantly bathed in the water. On June 27, 1909, while hunting over the rocks at the foot of the higher, or nearer, waterfall, we found a large larva of the same kind (No. 4 of the list on page 300) "crawling up out of the water on to a big rock. This being a hopeful indication of near transformation we secured him and carried him back to the cabin where we rigged up an ingenious and home-like stream for him in the fixing dish aided by a big stone and a bottle." All these went to our headquarters at Cartago but all died before they yielded the wished-for imago. We write of them now as *Thaumatoneura* larvae by reason of proof acquired ten months after their discovery. *Then* we had only the presumption based on their occurrence at the same localities with the winged individuals. On August 2, at the nearer waterfall, we found an exuvia which we took to be that of *Thaumatoneura*. Search for larvae at the farther waterfall on December 2 was unsuccessful. On March 23 and 26, 1910, larvae were not rare on the rock face of the nearer waterfall where it was kept wet by the spray and, on the 26th at least, where there was a thin layer of organic mud on the rock surface. A visit to the same fall on April 24 yielded twenty-two

* Ent. News, xxv, pp. 337-348. Oct., 1914.

exuviae, but none of them had an imago with it. They were chiefly on the rock face of the waterfall but in spots more or less protected from the falling water. Smaller larvae than those indicated by the exuviae were crawling over the rocks.

This waterfall was nearly vertical in its descent from the top of the canyon of the Rio Reventazon but, at about one hundred feet above the railroad track (which occupied a narrow ledge cut out of the cliff face), the water usually disappeared beneath a mass of boulders and flowed underground through loose soil to reappear on the slope far below the track. Up over these boulders we climbed to the foot of the actual fall with its vertical rock face. The amount of water over and among the boulders varied with the rains. On April 26 we ascended with more difficulty than usual, owing to the greatly increased flow of water which covered many of the usual footholds. Mrs. Calvert, who was in advance, found a large larva on the wet slippery face of the fall itself in such a position that a small projection above it gave it shelter from the direct spray. This larva we saw transform. She noted at the time: "Unlike other dragonflies we have watched transform, the wings while they hang limp and wet, in fact until they are full size and dry, are green. The body of the dragonfly is brown and green and as the creature hangs on the rocks, the body and wings giving the little trembling jerks that usually accompany the growing or 'filling out' of a transforming dragonfly, the likeness to a green leaf on a stem trembling in the breeze is very marked. There is a great deal of a small-leaved *Commelina* on the face of the fall as well as some delicate grasses, both of a bright pea-green, and we ourselves frequently confused the dragonfly we wanted to watch with one or other of these if we happened to move our eyes from it. It certainly seems to be a good case of protective coloring." Her record of the progress of transformation follows:

10.30 A. M. Head and thorax free dorsally.

10.35. Antennae and head entirely free, wings beginning to be withdrawn.

10.37. Front wings free.

10.37.40. Hind wings and first legs free.

10.38.20. Second legs and abdominal segments 1-3 out.

10.39.30. Third legs out, wings bright yellow, front edges and principal veins black, eyes almost black, body pale green chiefly. Resting period until

10.49, when imaginal legs grasped larval skin; very slender tracheal linings still connect exuvia and thoracic spiracles; width of head of adult much wider than head of exuvia.

10.59. Abdominal segments 4 and 5 free.

11.00. Sixth abd. seg. free.

11.00.10. Seventh; 11.00.15. Eighth; 11.00.40. All abdominal segments free. Wings still of exuvial length. Abdomen pale green, four longitudinal blue-brown lines on dorsum and spot on middle of lateral carina of each abdominal segment, appendages pale yellowish green. Following bluish-brown, labrum, clypeus, vertex, marks on middle prothoracic lobe, paramedian line and broad antehumeral stripe on mesepisternum, posthumeral stripe, double line above metastigma.

11.03. Wings lengthening, hind to end of abdominal segment 5.

11.11. Left hind wing as far as hind end of abdominal segment 8, the other three wings to hind end of abd. seg. 7.

11.13. Left hind wing to hind end of abd. seg. 10, the other three wings to segment 8. All wings pale pea green, veins blackish.

11.16. All wings longer than body plus appendages and subequal.

By 1 P. M. the green color had left the wings—how long before we do not know.

This (male) eventually colored as *Thaumatoneura inopinata* and, with other specimens, was left to dry in a paper bag, from which it was set free by some meddler on April 28 and so lost. Its exuvia, however, was carefully preserved and labeled at once. On the same morning and at the same place another larva was found transforming and yielded a male of *Th. pellucida** so that our previous surmises as to the identity of these larvae were established as definite facts.

On April 30 we went again toward the higher waterfall but, when we reached the mass of boulders below it, found that a

* In discussing the possible male dimorphism in *Thaumatoneura*, reference was made (Ent. News, xxv. p. 345) to similar phenomena in other animal groups. Since that article was published, Dr. T. S. Painter, of Yale University, has called my attention to the dimorphism of the males of *Maevia vittata*, a jumping spider. See his paper in Zool. Jahrb. Abth. Syst. Geogr. Biol. xxxv, pp. 625-636, 1913.

landslide had occurred changing their positions very greatly. We ascended a short distance to reconnoitre and saw that some small trees had fallen, blocking our usual path, while rocks larger than one's body had been rolled down, many of them being quite unstable. In fact the change since the 26th, when we were here, was far greater than at any time during the preceding ten months in which we had known this fall. We concluded not to ascend on account of the risk involved and went on to the farther waterfall where two good-sized *Thaumatoneura* larvae were obtained, one of which transformed as a female before we left the fall. We subsequently learned that on April 28, when we were in a different locality, two distinct falls of rock, with the sound of crashing of tree branches, were heard in the direction of the higher waterfall, accompanied by the odor of newly-disturbed forest earth. It was our good fortune that this landslide did not occur until after our ten months' search had been crowned with success and we could smile at the efforts of the Genii of the Fall to veil the secret of *Thaumatoneura* from us.

To make our larval record complete—one was secured on May 1 at a third waterfall, near the iron bridge over the Rio Reventazon, 800 feet below the railroad.

The habit of dwelling in and around waterfalls and cascades which we have described for *Thaumatoneura,* larva and adult, and which is also the habit of *Argia talamanca* associated with it, does not appear to have been mentioned for any other Odonata. Yet it is likely that such a habit will be found to exist in some other members of this group of insects, especially in the tropics of the Old World, where topographic and climatic conditions similar to those of Costa Rica prevail. In countries where frost occurs the low temperatures incident to this phenomenon may prevent the survival of Odonate larvae in waterfalls of small volume, where the water is spread out in a sheet of but a few centimeters in depth, as is the case in those falls which *Thaumatoneura* inhabits. On the other hand, the force exerted by falling water in *large* volume may be too great to permit Odonate larvae dwelling therein.

Diatoms Attached to the Larvae.

While examining the larvae and exuviae of *Thaumatoneura* the great number of diatom shells attached to them was very apparent. A single leg, which had been detached from an exuvia, was sent to Prof. Albert Mann, Custodian in charge of the Diatom Collection of the U. S. National Museum at Washington, who has sent the following remarks on the diatoms adhering to this member:

The species discovered on this very minute quantity of material are as follows:

Achnanthes ventricosa Ehr.
Cocconeis placentula Ehr.
and variety.
Cymbella ventricosa Ag.
Epithemia gibba (Ehr.) Kg.
E. gibberula (Ehr.) Kg.
E. zebra (Ehr.) Kg.
and variety.
Eunotia monodon Ehr.
Gomphonema parvulum Kg.
Navicula viridis Kg.
N. oblonga Kg., var.
N. n. sp.
Nitzschia sp.
Pleurosigma sp.
Synedra ulna (Nitz.) Ehr.

Of the foregoing, *Epithemia zebra* is by far the most frequent, *Gomphonema parvulum* next, *Synedra ulna* next, *Achnanthes ventricosa* next, and the others rather infrequent. The unnamed *Nitzschia* and *Pleurosigma* afforded only one specimen each and their position was such that I was unable to correctly identify them, but I am quite confident that they are not new. The new *Navicula* is extremely small and very delicately marked, and I fortunately have two specimens.

I should say that there were at least 500 diatoms on the small leg of this larva. The most of these are forms that grow attached by a transparent jelly-like stipe; but several of them are free and free-moving—for example, the different species of *Navicula*.

The finding of these forms on this aquatic larva is of importance because it helps to throw light upon a difficult problem connected with the distribution of diatoms. It has always been more or less of a mystery how isolated pools and bodies of water of recent origin become stocked with a rather extensive diatom flora and frequently within a very short period of time. Little is known regarding the spore formation of diatoms, investigations in this respect having been confined almost exclusively to pelagic marine forms, such as *Rhizosolenia*. In most of the genera no spore formation has ever been discovered. Some light has been thrown upon this distribution by supposing these organisms are carried on the feet of wading birds, but this method of transportation is plainly very inadequate. If, however, we add to this transportation by aquatic insects, many of which have the power of flying, we have

a means of transportation that goes a long way to explaining the sudden appearance of large numbers of diatoms in new localities.

I therefore look upon this rather abundant flora on the minute leg of this aquatic insect as of some scientific importance. Of course, in this case the power to fly does not exist until a later period of development, but many of the water beetles and other insects are doubtless coated with living diatoms in the same way.

A reference to Van Heurck's *Treatise on the Diatomaceae* (English translation by Baxter, London, 1896) shows that most of the diatoms listed above, and especially those of most frequent occurrence, are "common everywhere," at least throughout Europe and, as they occur in Costa Rica also, probably throughout the world. It is of interest, moreover, to compare the data on the diatoms found attached to *Thaumatoneura* larvae with those relating to the diatoms enumerated, as occurring on the nymphs of various Odonata of the United States, by Miss Lyon in the NEWS for January, 1915, pp. 4-6.

DESCRIPTION OF THE LARVAE.

Material Studied. Larvae in alcohol:

(*a*) From hanging roots in farther waterfall, Juan Viñas, 3300 feet (1000 metres), June 26 and 27, 1909. Nos. 1, 2, 4 and 5, males, No. 3, female. (For No. 4, see Pl. xi., figs. 2, 3.)

(*b*) From nearer waterfall, Juan Viñas, 3400 feet (1036 metres), March 23 and 26, 1910. Nos. 6 to 8, females. (For No. 8, see Pl. xi, fig. 1.)

(c) From the same waterfall, April 24, 1910. No. 9, ♂.

[All of these died in attempted rearing. The following *Thaumatoneura* larvae are recorded in our rearing list and, as there is no entry of their having died, were presumably lost in the earthquake at Cartago, May 4, 1910:* No. 76 (one), No. 77 (one), No. 78 (two) all from the nearer waterfall, Juan Viñas, March 26, 1910.]

Exuviae:

♀ Nearer waterfall, as above, Aug. 1, 1909.

♂ *inopinata* same locality. April 26, 1910. (Watched in transformation.

♂ *pellucida* same locality, April 26, 1910. (Watched in transformation.)

17 ♂ ♂, 9 ♀ ♀ same locality, April 24 and 26, 1910, in various degrees of preservation.

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* See Ent. News, xxi, p. 336. July, 1910.

The exuvia of April 30 was probably lost in the earthquake.

The following description is based on all the larvae studied and on the two exuviae of *inopinata* ♂ and *pellucida* ♂. The differences shown by the larvae of various sizes are given in the table on page 304. As has already been stated,* I have not been able to find any differences between these two exuviae other than those due to injuries sustained by the larvae previous to transformation.

Head shallowly concave posteriorly. Compound eyes and their ommatidial lenses very distinct; in most of the alcoholic larvae the dorsal surface of the eye below the chitin showing dull greenish-blue with 9 to 11 diverging darker streaks which radiate from a point caudad to the inner posterior dorsal angle of the eye. Ocelli indicated by three smoother patches amid the otherwise finely wrinkled and finely spinulose dorsal surface of the head. Nasus of the larvae with four pale streaks extending from its superior to its inferior margin, two of them submedian, the other two lateral, right and left. Labrum hardly notched on its free margin, which is obscured by matted hairs in the exuviae, especially at each side where, viewed from above, they form a small tuft. Edges of the genae which bound the eyes posteriorly and inferiorly with a row of closely-set spinules.

Antennae 7-jointed, decreasing in diameter from 1 to 7, lengths of the joints in larva No. 4: (1) .64, (2) .48, (3) .4, (4) .224, (5) .224, (6) .16, (7) .064, total 2.192 mm.

Mandibles stout. Right mandible (Pl. XI, figs. 4, 4*i*) at its apex with four teeth, of which the most dorsal or foremost is usually the widest, the second the smallest, the third and fourth longer than the other two, the fourth longest and having on its inner ventral edge a small basal denticle; on the inner surface, proximal to and distinctly separated from these apical teeth is a shorter, tapering and curved process terminating in an acute apex and bearing a minute anteapical posterior denticle. Left mandible (Pl. XI, figs. 5, 5*i*) with apical teeth similar to those of the right, but the foremost (most dorsal) tooth has a small dorsal denticle (except in larva No. 1) and the fourth (most ventral) tooth has no basal denticle and in some is no longer than, or even not quite as long as, the third tooth; the process on the inner surface is much larger antero-posteriorly than that of the right side, forming when viewed from below (the mandibles being open) a crescent-shaped ridge whose edge is crenulate or denticulate and terminates at both anterior and posterior ends in a slender acute spine; the concavity of the crescent is proximal. These processes of the inner surface of each mandible appear to correspond with the inner branch of the mandible of the larvae of *Cora*.† The lateral surface of

* Ent. News, xxv, p. 345. Oct., 1914.

† *Cf.* Ent. News, xxii, p. 52, pl. II, fig. 16.

the base of each mandible is armed with small spinules. Near the middle of the ventral face is a row or group of about ten setae.

Maxillae similar to those of *Cora*,† the attenuate tip of the inner lobe with one immovable tooth and two more proximal movable spines. There is a membranous supralingua between each maxilla and the hypopharynx proper, not visible in the exuviae.

Labium (Pl. XI, figs. 6, 8) when at rest reaching caudad to the level of the bases of the prothoracic legs but not as far as that of the hind ventral prothoracic margin. Median (mental) lobe with the distal margin 1.2 times as wide as its mid-longitudinal length, produced distinctly distad in the middle and there bilobulate, but the emargination which separates the lobules not reaching proximad as far as the level of attachment of the lateral labial lobes; a minute tooth on the inner dorsal surface of each lobule a short distance within (proximal to) the distal margin and a greater distance from the median line; this is *t** of the larva of *Cora* as shown in fig. 28, pl. III, *l. c.*, and the "pronounced tooth . . . on the sutural line" of the labium of larval *Lestes* (BUTLER)‡; distal margin minutely crenulate for its entire length, a very short seta between each crenulation and the next, lateral margins spinulose near the articulations of the lateral labial lobes; mental setae usually absent, but two pairs of short setae have been observed on each side of and near the emargination separating the two lobules of the distal margin. Lateral labial lobes spinulose laterad near base, without setae, each with a long curved tapering terminal spine ("movable hook") and two stout distal teeth, both shorter than the terminal spine, the inner (mesal) of the two longer than the other; three distal teeth exist in the larva of *Cora*, the most internal of which appears to be absent in *Thaumatoneura*.

Dorsal surface of *prothorax* sharply defined on all sides by a carina having a hexagonal outline (counting the curved anterior and posterior edges as but one each). Propleuron bounded inferiorly by a carina ending anteriorly in a spinulose tubercle. Mesostigmata very distinct, on transverse tubercles, open in larva No. 4 and probably in the exuviae, not open in the other larvae. Mesopleuron with a marginal carina. Metastigmata indicated, small, apparently not open.

Legs moderately long, moderately slender, each coxa with a superior spinulose tubercle, three tarsal joints, two curved simple tarsal claws, empodium present.

Abdomen triangular in cross-section, but the mid-dorsal angle rounded, each segment wider than high; of 10 complete segments which decrease in width very gradually and slightly from 1 to 5, more markedly from 6 to 9. Segment 1 with a short transverse row of setae

† *L. c.* p. 53, pl. III, figs. 29, 31.

‡ Trans. Amer. Ent. Soc., xxx, p. 114, 1904.

on the mid-dorsum at about three-fifths of the segment's length; on 2 to 5 this row is represented by two separated patches of setae, one on each side of the mid-dorsal line and at the same part of each segment's length; on the dorsum of 6 to 10 are also similar setae but apparently, in most specimens, not as regularly arranged as on 1 to 5; in addition to the setae 1 to 10 bear longer, softer hairs. Hind dorsal margin of 10 with a wide shallow median emargination. Grooves separating the sternites of 1 to 9 from the inflexed ventral parts of the tergites more distinct in the exuviae than on the larvae, in some of which latter they are very slightly marked.

Caudal "gills" three, evidently much subject to injury and regeneration, when fully developed each two-jointed, the first joint thicker and higher than the second; median or mid-dorsal gill (Pl. XI, figs. 9, *9d*, *9v*) with a mid-dorsal and a mid-ventral longitudinal carina on the first joint, the mid-dorsal carina being more convex and armed with shorter, stouter spines, while the mid-ventral carina is less convex and bears longer, more slender hairs. Each lateral gill (Pl. XI, fig. 7) with two longitudinal carinae on the mesal surface of the first joint, one of which is dorsal the other ventral; between these two carinae is thus a longitudinal trough or valley; in profile view the dorsal surface is more convex than the ventral. The second joint in all three gills is subcylindrical. When only one joint is present in any of these three gills it is probably a case of incomplete regeneration after injury. The surfaces of the three gills bear many soft hairs in addition to those on the carinae but can not be described as densely hairy.

Cercoids (superior appendages of the imago) slender, tapering, curved ventrad and applied closely for their entire length to the hind surface of abdominal segment 10.

♂. Rudiments of the copulatory apparatus visible on the ventral side of abdominal segment 2 in the larger larvae and in the exuviae. Gonapophyses on 9 represented in the larger larvae by two slightly elevated subcircular areas separated from each other by about the diameter of one of them, each bearing at its hind end 1 to 3 posteriorly-directed spines.

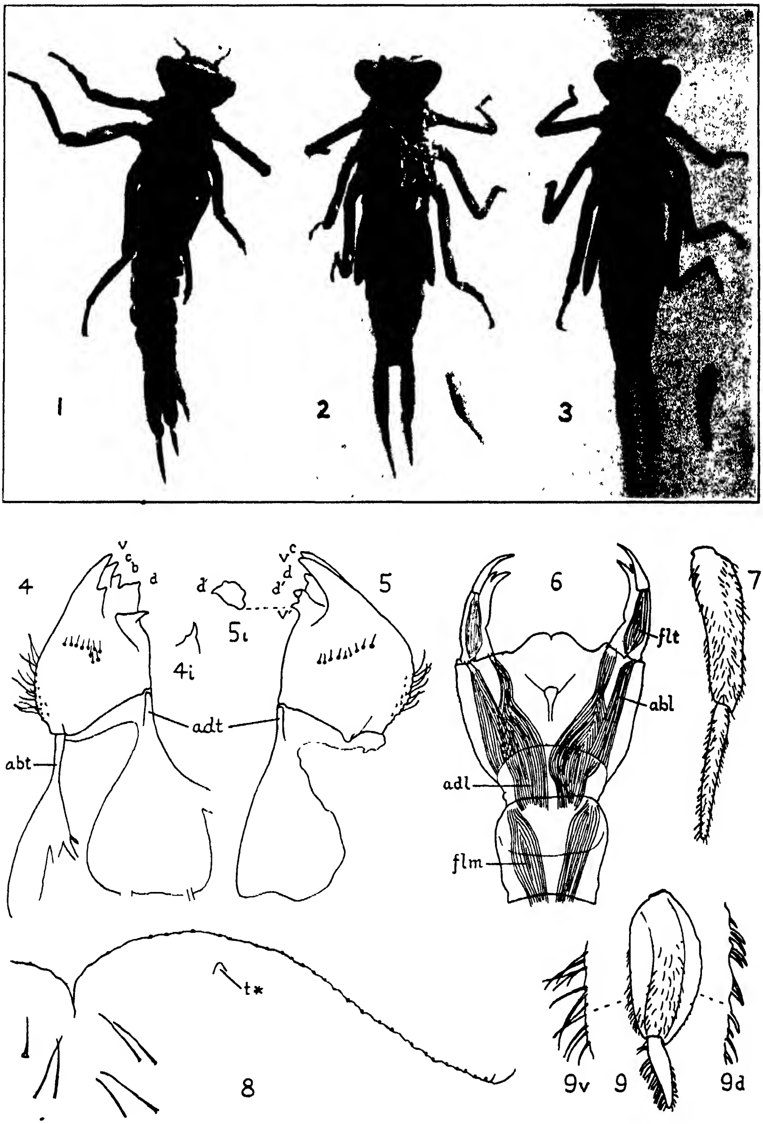
♀. Gonapophyses of abdominal segments 8 and 9 of variable length as indicated in the table on page 304.

The larvae preserved in alcohol have the body ochre with black markings.

Some of the internal organs of these larvae will be considered in the next number of these Studies.

TABLE SHOWING DIFFERENCES BETWEEN THE LARVAE AND EXUVIAE OF THAUMATONEURA ARRANGED ACCORDING TO SEX AND SIZE

All *measurements* in millimeters	Larva No. 1, ♂	Larva No. 2, ♂	Larva No. 9, ♂	Larva No. 5, ♂	Larva No. 4, ♂	Exuvia *inopinata* ♂	Exuvia *pellucida* ♂	Larva No. 3, ♀	Larva No. 6, ♀	Larva No. 7, ♀	Larva No. 8, ♀	Exuvia April 26, ♀
Total length	14.5	17.	23.	23.5	31.	?	34.	20.5	22.	?	26.5	34.
Length excluding caudal gills	10.	12.	15.	16.5	21.5	26.5	27.	15.5	17.	17.5	18.	24.5
Length of abdomen excluding caudal gills	5.	6.7	7.5	10.	11.	16.	15.	8.	9.8	10.5	11.75	14.5
Width of head at the eyes	3.	4.	5.25	4.	6.3	6.5	6.8	4.5	?	4.5	5	6.1
Width of abdomen at sigment 8	2.5	3.3	4.	3 5	?	3.25	4.5	3.5	?	4.	4.	4.2
Length of third femur	2.5	3.5	4.5	3.5	5.3	5.5	6.	4.	4.2	4.3	4.75	5.9
" " tibia	2.75	4.	5.5	4.	6.	6.	6.5	4.5	4.5	4.6	5.5	6.4
Width of labium at distal margin of median lobe	2.	2.74	3.5	2.8	4.63	4.45	4.7	3.07	3.33	3.42	3.71	4 8
Number of crenulations on one-half of the distal margin of median labial lobe	21	27(R),24(L)	31	24	35	34	34	29	31	30	31	36
Front wing pads reach to	one-half metathorax	not to hind edge metanotum	five-sixths abd. seg. 3	hind edge metanotum	?	hind edge abd. seg. 3	hind edge abd. seg. 4	one-half abd. seg. 1	hind edge abd. seg. 1	one-third abd. seg. 1	hind edge abd. seg. 2	five-sevenths abd. seg. 4
Hind " "	front edge ab. seg. 1	hind edge abd. seg. 1	five-sixths abd. seg. 4	hind edge abd. seg. 1	?	middle abd. seg. 4	hind edge abd. seg. 4	middle abd. seg. 2	hind edge abd. seg. 2	one-half abd. seg. 2	middle abd. seg. 3	two-sevenths abd. seg. 4
Length of first joint, median caudal gill	2.	2.5	—	3.	6.	—	3.5	3.	3.5	—	3.25	3.2
" second " " "	—	1.5	—	1.5	—	—	2.5	2.	1.5	—	1.75	2.2
Total length median caudal gill	2.	4.	—	4.5	6.	—	6.	5.	5.	—	5.	5.4
Length of first joint, right lateral caudal gill	2.	2.	—	4.	5.	—	5.	3.	—	—	2.25	4.7
" second " " " " "	1.	1.5	—	3.	3.5	—	6.	2.	—	—	1.25	4 9
Total length " " " "	3.	3.5	—	7.	8.5	—	11.	5.	—	—	3.5	9.6
Length of first joint, left " " "	3.	3.	4.	4	5 25	2.5	4.5	—	—	—	4.	4.3
" second " " " " "	2.	2.	4.	3.	4.75	2.	4.	—	—	—	4.	4.1
Total length " " " "	5.	5.	8.	7.	10.	4.5	8.5	—	—	—	8.	8.4
Rudiments of copulatory apparatus on abdominal segment 2, ♂	—	—	—	—	+	+	+					
Rudiments on gonapophyses on abdominal segment 9, ♂	—	—	(+)	—	+	+	+					
Gonapophyses of abdominal segment 8, ♀, reach to								one-half abd. seg. 9	two-thirds abd. seg. 9	less than half abd. seg. 9	beyond abd. seg. 9	six-sevenths abd. seg. 10
Median gonapophyses of abdominal segment 9, ♀, reach to								three-fourths abd. seg. 9	four-fifths abd. seg. 9	three-fifths abd. seg. 9	one-half abd. seg. 10	not visible
Outer gonapophyses of abdominal segment 9, ♀, reach to								hind edge abd. seg. 9	hind edge abd. seg. 9	six-sevenths abd. seg. 9	three-fifths abd. seg. 10	six-sevenths abd. seg. [illegible]



THAUMATONEURA LARVA—CALVERT.

Explanation of Plate XI.

All the figures are of *Thaumatoneura* larvae or of parts thereof.

Figs. 1 to 3 are from photographs by Mr. H. A. Walters, of alcoholic specimens.

Fig. 1, larva No. 8, ♀, dorsal view. x 2.

Figs. 2, 3, larva No. 4, ♂, dorsal and ventral views respectively x 1.8. The median caudal gill is detached and lying on its side.

Figs. 4 to 9 are from camera drawings made with a binocular stereoscopic, or a compound, microscope; figs. 4 to 6 and 8 are from larva No. 4, ♂.

Figs. 4, 5, ventral views of the right and left mandibles respectively of larva No. 4, ♂. *d, b, c, v,* the apical teeth, *d* the most dorsal, *v* the most ventral; d^1 the most dorsal, v^1 the most ventral, spine of the inner process of the left mandible; *abt, adt,* tendons of the abductor and adductor muscles respectively. x 12.

Fig. 4*i*, curved inner process of the right mandible viewed from the base of the mandible to show the minute ante-apical denticle.

Fig. 5*i*, outline of the end view, or mesal surface, of the inner process of the left mandible.

Fig. 6. Labium, dorsal surface. *abl* abductor, *adl* adductor of the lateral lobe; *flm* flexor of the mentum, *flt* flexor of the terminal or movable hook. x 5.

Fig. 7. External view of left lateral gill of larva No. 5, ♂, drawn *in situ* on the larva. x 5.

Fig. 8. Right half of the distal margin of the median labial lobe, *t** tooth. x 53.

Fig. 9. Left profile view of the median caudal gill of larva No. 6; 9*d* a small piece of the dorsal edge of proximal joint of the same gill; 9*v* a small piece of the ventral edge of proximal joint of the same gill. Fig. 9, x 5, 9*d* and 9*v*, x 30.

Note on the Bombyliid Genus Rhabdopselaphus Rondani (Pseudogeron Cress.) (Dip.).

In a previous issue of this Journal* I published a paper on a supposed new genus (*Pseudogeron*) of this family allied to *Geron*. Since then Prof. Aldrich has called my attention to the possible synonymy of my genus with *Rhabdopselaphus* Rond., (Bul. Soc. Ent. France, 1886, p. ciii), based on Dr. Williston's note on page 389 of his *Manual* (third edition). I regret that I had not studied the Manual more thoroughly, for I was naturally led astray by Rondani's mention of three submarginal cells in his generic description. Dr. Williston, who has examined the type of *Rhabdopselaphus,* notes that it has only two submarginals. This fact, with the form of the antennae and palpi, seems to be sufficient proof of the synonymy. My name for the genus must therefore be replaced by *Rhabdopselaphus* Rondani with *R. mus* Rond. =*Geron capax* Coq. as the type species. It is quite evident from the description that *R. mus* is synonymous with *Geron capax* Coq.. This genus is closely allied with *Oligodranes* Lw. (1844) and *Apolysis* Lw. (1860). From the former it differs in the form of the palpi which here have the terminal joint very long, this being the only one visible; also in the slightly different third antennal joint. From the latter it differs in the presence of the complete discal cell.—E. T. Cresson, Jr., Academy of Natural Sciences of Philadelphia.

*Ante page 200.

Records of Orthoptera from Newfoundland.

By MORGAN HEBARD, Philadelphia, Pa.

In a recent trip to Newfoundland, Mr. G. P. Englehardt collected a number of specimens of Orthoptera. Through the kindness of Mr. Charles Schaeffer we are now able to record this material, the first series of the Order collected on that island, which is the property of the Museum of the Brooklyn Institute of Arts and Sciences.

ACRIDIDAE.

TRYXALINAE.

Chorthippus curtipennis (Harris). Cape Ray, Nfd., VIII, 17, 1912, 1 ♂, 1 ♀.

These specimens are short-winged and both have the sides of the head, lateral lobes of the pronotum and the pleurae, dark green.

Mecostethus gracilis (Scudder). Cape Ray, Nfd., VIII, 17, 1912, 1 juv. ♂. Port aux Basques, VIII, 1912, 1 juv. ♀.

OEDIPODINAE.

Circotettix verrucullatus (Kirby). Port aux Basques, Nfd., VIII, 1912, 2 ♂, 3 ♀.

LOCUSTINAE.

Melanoplus fasciatus (Walker). Stephenville, Bay St. George, Nfd., VIII, 1912, 1♀. Cape Ray, Nfd., VIII, 17, 1912, 2♂, 2♀. Port aux Basques, Nfd., VIII, 1912, 5♂, 4 ♀, 1 juv. ♀.

These specimens are all very robust for the species and are short-winged. None show the brilliant type of coloration sometimes found in the species.

Melanoplus femoratus (Burmeister). Port aux Basques, Nfd., VIII, 1912, 1♂.

This specimen is brilliantly colored, with caudal tibiae and tarsi bright nopal red.

TETTIGONIIDAE.

STENOPELMATINAE.

Ceuthophilus terrestris Scudder. Humber Mouth, Bay of Islands, Nfd., VII, 1912, 1 juv. ♂. Spruce Brook, Nfd., VIII, 10 and 16, 1912, 1 ♂, 2 ♀. Stephenville, Bay St. George, Nfd., VII, 14, 1912, 1 juv. ♂.

The adults recorded above are very large for this species. Length, of body, ♂ 15.5, ♀ 14.2 and 15.; of caudal femur, ♂ 14., ♀ 13. and 14.; of caudal tibia, ♂ 14.8, ♀ 13.9 and 15.1 mm.

Coleoptera found in the Vicinity of Meriden, Connecticut.

By HARRY L. JOHNSON, South Meriden, Conn.

For several years the writer has been greedily watching the columns of ENTOMOLOGICAL NEWS for some list of the beetles of Connecticut but as yet he has not been rewarded. As I have collected in Connecticut for several years and now have a list of some 300 species of Coleoptera taken in this vicinity, I am sending it to the NEWS with the hope that it will give added interest to those who are lucky enough to enjoy life in this State and enable outsiders to compare the lists of other States with those of Connecticut.

During the Summer of 1914 the writer built a large Lepidoptera breeding cage about 6 x 6 x 7 feet high, which was enclosed with common wire netting such as used for screen doors, etc. This cage was located to the north of a strip of land which was plowed immediately after the erection of the cage, and as the wind was strongly south on that day, the cage became a veritable beetle trap. Hardly a minute elapsed in which some unlucky beetle was not blown against the sides of the cage and held there by the wind while I came to the rescue with the cyanide bottle. About fifty species were secured in this way, among them being *Hylotrupes ligneus* and *Geotrupes splendidus*. Over 100 specimens of *Phytonomus meles* were secured on the sides of this trap. The writer is now hoping that the wind will be in the same direction when the land is turned over this year.

The following list of Coleoptera is intended to form a basis upon which future lists of Connecticut beetles may be added, and the writer hopes that entomologists from other parts of Connecticut will come forward with species to add to the list. As about fifty unidentified species are now in my hands, I hope to be able to add some species myself before the year is over.

Family CICINDELIDAE.

Cicindela sexguttata Fab. A common species. Occurs without spots and also with two, four and six spots.

Cicindela purpurea Oliv. Found commonly both spring and fall. Occurs in meadows and is easily mistaken for a grasshopper in flight. Have taken one green specimen of this species.

Cicindela repanda Dej. Most common species of the family.

Cicindela repanda var. **12-guttata** Dej. Taken sparingly on railroad track during season of 1914.

Cicindela vulgaris Say. Taken along sandy places in company with *C. repanda.*

Cicindela formosa generosa Dej. Taken sparingly along roadsides.

Cicindela punctulata Oliv. Taken commonly in meadows and along roadsides.

Family CARABIDAE.

Cychrus lecontei Dej. One specimen May 14, 1914, under rotten bag in field.

Carabus sylvosus Say. One specimen beneath rubbish in dense woods.

Calosoma calidum Fab. Quite a common species with spots varying from bronze to bright green. Deformed specimens common.

Nebria pallipes Say. This species occurs sparingly under boards and rubbish.

Clivina impressifrons Lec.

Ardistomis viridis Say. One specimen taken August 8, 1910.

Patrobus longicornis Say. Rare. One specimen Sept. 7, 1910.

Pterostichus lucublandus Say. Common.

Pterostichus luctuosus Dej. Not common.

Pterostichus pennsylvanicus Lec. (?) One specimen taken Sept. 27, 1914.

Amara interstitialis Dej. Common through entire summer.

Amara avida Say. Only two specimens taken.

Amara pallipes Kirby. One specimen May 3, 1914.

Platynus placidus Say. One specimen Oct. 7, 1912.

Platynus melanarius Dej. One specimen May 21, 1912.

Platynus extensicollis Say. One specimen Aug. 24, 1912.

Platynus decens Say. Rare.

Platynus cupripennis Say. A common ground species.

Casnonia pennsylvanica Linn. Took one Aug. 15, 1913, but have not seen it since.

Galerita janus Fab. Taken commonly at light.

Lebia viridis Say. Common under rubbish during the month of May.

Lebia collaris Dej. Taken sparingly during June and July.

Cymindis pilosa Say. One specimen Nov. 26, 1913.

Brachynus cyanipennis Say. Common on shores of ponds during the dry season in summer.

Brachynus deyrollei Laf. One specimen July 27, 1912.

Chlaenius diffinis Chd. Common under stones in company with *B. cyanipennis.*

Chlaenius sericeus Forst. Occurs commonly with above species.

Chlaenius tricolor Dej. Also occurs with the two species above.

Agonoderus pallipes Fab. Taken commonly on the wing during April & May.

Gynandropus hylacis Say. Quite a rare species in this vicinity.

Harpalus caliginosus Fab. This is our commonest and largest species.

Harpalus erraticus Say. Common under logs and rubbish in sandy places.

Stenolophus fulginosus Dej. Two specimens taken from bark of maple.

Stenolophus plebeius Dej. Very common under maple bark.

Bradycellus rupestris Say. Not common.

Anisodactylus baltimorensis Say. A common species through entire summer.

Anisodactylus carbonarius Say. Quite rare. One specimen Aug. 6, 1914.

Anisodactylus sayi Blatchley. A very common species.

Anisodactylus lugubris Dej. Taken sparingly.

Anisodactylus verticalis Lec. One specimen Sept. 7, 1912.

Anisodactylus discoideus Dej. Taken under logs in sandy locations.

Family HALIPLIDAE.

Cnemidotus 12-punctatus Say. Taken plentifully in March.

Family DYTISCIDAE.

Hydroporus undulatus Say. Occurs commonly with the above species.

Agabus gagates Aubé. Rare. One specimen Sept. 29, 1912.

Coptotomus interrogatus Fab. Not very common.

Dytiscus hybridus Aubé. A common species in local ponds.

Dytiscus verticalis Say. Common. Taken in company with above.

Acilius semisulcatus Aubé. Rare. One specimen Sept. 23, 1912.

Colymbetes sculptilis Harr. Rather common. All my specimens were taken at arc lights.

Family GYRINIDAE.

Gyrinus ventralis (?) Kirby. This is one of our commonest water beetles and is to be found the year round.

Dineutes hornii (?) Rob. Found continually in company with above species.

Family HYDROPHILIDAE.

Hydrocharis obtusatus Say. Have taken many at electric lights.

Berosus striatus Say. Taken flying in late spring.

Hydrobius fuscipes Linn. Also taken at arc lights but not common.

Family SILPHIDAE.

Necrophorus americanus Oliv. Taken at electric lights. Most specimens are covered with small yellowish lice. [?]

Necrophorus orbicollis Say. Also taken at lights, but more common than the above.

Necrophorus marginatus Fab. Rare. One specimen Oct. 9, 1912.

Necrophorus tomentosus Web. Taken commonly in fields and pastures.

Silpha surinamensis Fab. Occurs plentifully at light. Have one specimen of a dully brownish-yellow color.

Silpha inaequalis Fab. Taken from dead animals in late spring.

Silpha noveboracensis Forst. Common.

Silpha americana Linn. Another common species.

Family STAPHYLINIDAE.

Quedius fulgidus Fab. Common all through the season. Varies in length from 7 mm. to 18 mm.

Dianous species? A small black species taken frequently by sweeping.

Creophilus villosus Grav. Very common.

Listotrophus cingulatus Grav. Another common species. Very plentiful in late spring.

Family COCCINELLIDAE.

Anisosticta strigata Thunb. A good species, but not common.

Megilla fuscilabris Muls. A common garden insect occurring plentifully on corn.

Hippodamia convergens Guer. Found commonly feeding on aphides of various kinds.

Hippodamia 13-punctata Linn. Found with above but not over common.

Hippodamia parenthesis Say. One of the rarer species.

Coccinella sanguinea Linn. Found feeding on aphides. Quite common.

Coccinella transversoguttata Fab. Taken quite commonly on cherry and plum trees.

Coccinella trifasciata Linn. Not very common. Occurs with the above.

Coccinella 9-notata Hbst. Very common.

Adalia bipunctata Linn. Our commonest species. Occurs all the year round.

Adalia frigida Schn. Rare. One specimen May 26, 1912.

Anatis 15-punctata Oliv. Common. Many forms. Spots entirely obliterated in some specimens.

Psyllobora 20-maculata Say. Taken crawling along the ground under dense vegetation.

Chilocorus bivulnerus Muls. A very common species on wild cherry. Wings of young or newly emerged specimens are light red and flexible to touch.

Brachyacantha ursina Fab. Common on shrubbery. Taken by sweeping.

Hyperaspis fimbriolata Mels. Common. Procured by sweeping low shrubs.

Hyperaspis proba Say. Occurs commonly with above.

Hyperaspis tenebrosa Muls. Obtained by sweeping. Occurs with above two species.

Hyperaspis binotata Say. Rare.

Family Endomychidae.

Endomychus biguttatus Say. Taken from fungus and also under bark of elm.

Family Erotylidae.

Languria mozardi Lat. A beautiful species. Occurs on heads of dandelion.

Family Cucujidae.

Catogenus rufus Fab. Taken under bark of hickory.

Cucujus clavipes Fab. Also occurs under bark of hickory but sparingly.

Family Dermestidae.

Dermestes marmoratus Say. Quite common on skeletons of cattle and horses.

Dermestes lardarius Linn. Very common and destructive to cabinet specimens.

Anthrenus scrophulariae Linn. Common on blossoms of wild cherry.

Anthrenus thoracicus Melsh. Common on blossoms of wild cherry.

Family Histeridae.

Hister interruptus Beauv. Very common in pastures.

Family Nitidulidae.

Omosita colon Linn. Common on old skeletons of cattle. Also taken flying in spring.

Ips quadriguttata Fab. Occurs under bark of elm and ash.

Family Elateridae.

Elater hepaticus Say. Rare.

Elater nigricollis Hbst. Rare. Under elm bark.

Elater sanguinipennis Say. Rare.
Adelocera discoidea Web. Rare. One specimen Feb. 2, 1909.
Adelocera obtecta Say. Rare.
Alaus myops Fab. Not common. Varies considerably in size.
Alaus oculatus Linn. Rare. Take about two each year.
Cardiophorus robustus Lec. Rare. Taken by sweeping.
Monocrepidius lividus DeG. Taken from bark of oak, maple and elm.
Monocrepidius vespertinus Fab. Rare. One specimen April 8, 1912, under bark.
Ludius attenuatus Say. Rare. Taken in mid-summer from low shrubs.
Melanotus castanipes Payk. Not common.
Melanotus fissilis Say. Very common under bark of oak, maple and elm.
Corymbites pyrrhos Hbst. Rare. One specimen Aug. 8, 1914.
Corymbites hieroglyphicus Say. Rare. Taken from low shrubbery in July.

Family Buprestidae.

Chalcophora virginiensis Drury. Rare. One specimen from telephone pole, March 21, 1911.
Dicerca lurida Fab. Not common.
Dicerca divaricata Say. Found sparingly on elm and oak in late spring.
Chrysobothris floricola Gory. Rather rare. Taken flying.
Acmaeodera tubulus Fab. Taken by sweeping. Very rare.
Agrilus ruficollis Fab. Common.
Agrilus egenus Gory. Also common. Taken by sweeping.
Agrilus otiosus Say. Occurs with above species but rather rare.
Agrilus bilineatus Web. Rare. Only a few specimens taken.
Agrilus lateralis Say. Very rare. One specimen June 11, 1909.
Brachys ovata Web. Obtained fairly plentifully by sweeping.
Brachys aerosa Melsh. Not as common as above, but occurs with it.
Taphrocerus gracilis Say. Rare. Taken by sweeping low shrubbery.
Pachyscelis purpureus Say. Occurs on low plants in sandy regions.

Family Lampyridae.

Plateros modestus Say. Common in 1914. Rare in former years.
Ellychnia corrusca Linn. Common under bark of maple, elm, oak and ash.
Photuris pennsylvanica DeG. Occurs sparingly on low shrubbery.
Chauliognathus marginatus Fab. Very rare here. Took one specimen July 18, 1914.

Chauliognathus pennsylvanicus DeG. Very common. Occurs on golden rod in late summer.

Podabrus tricostatus Say. Rather rare.

Telephorus tuberculatus Lec. Rare.

Telephorus dentiger Lec. Also rare but is met with more often than the preceding species.

Telephorus bilineatus Say. Not common. Took this species only in 1914.

Family MALACHIDAE.

Malachius aeneus Linn. Rare. Have taken but one specimen of this. I found this specimen in back of a machine shop, but failed to catch it the first time, owing to the fact that I took it to be a Cicindelid. About a week later I happened to be on the same spot and saw it again, with the result that I captured it. I believe this was the same specimen I saw the first time, as the plot of ground was enclosed by a high fence.

Family LUCANIDAE.

Lucanus dama Thunb. Common. Taken mostly at light.

Passalus cornutus Fab. Rare. Took one specimen June 21, 1914, in old elm stump.

Dorcus parallelus Say. Rather rare. Took about 8 specimens on electric light poles between the hours of 8 to 10 on warm evenings.

Family SCARABAEIDAE.

Canthon laevis Drury. Rare. One specimen Sept. 31, 1914.

Canthon chalcites Hald. Very rare.

Copris carolinus Linn. Common. Varies considerably in size.

Onthophagus hecate Panz. Not as common as above, but found frequently flying over low meadows.

Aphodius granarius Linn. Our most common species. Found during entire summer.

Aphodius fimetarius Linn. Practically as common as above species, but not so much in evidence.

Geotrupes splendidus Fab. Rare. Took one specimen Oct. 20, 1912, in depression in ground under rotten apple.

Geotrupes balyi Jek. Rare also.

Trox suberosus Hbst. Occurs by hundreds in refuse heap of blacksmith shop.

Trox unistriatus Beauv. Common with above species.

Amphicoma vulpina Hentz. Very rare. One specimen taken on lawn June 1, 1912.

Hoplia trivialis Harold. Not common. Found flying around low shrubbery in May and June.

Dichelonycha elongata Fab. The only species that seems to occur here and it is not common. Found on ash and maple soon after leaves have opened out.

Serica vespertina Gyll. Not common. Found at electric lights.

Serica sericea Ill. Common. Also taken at lights.

Serica intermixta Blatchley. Common on wild rose.

Macrodactylus subspinosus Fab. Common on both cultivated and wild roses. Also occurs on pussy willow.

Lachnosterna fusca Froh. Very common. Interferes with collecting at light and also a great bother when sugaring.

Lachnosterna gibbosa Burm. Not common. Occurs at light.

Ligyrus relictus Say. Common. Occurs at light during mid-summer.

Anomala lucicola Fab. Rather rare. Found on electric light poles during mid-summer.

Anomala binotata Gyll. Rare. Taken on lawns.

Valgus squamiger Beauv. Rare. Procured by sweeping low shrubs.

Pelidnota punctata Linn. Common. Is to be found in considerable numbers at lights.

Cotalpa lanigera Linn. Common. Occurs on willow in early spring. I have one specimen in which the head and thorax are bright green, while the elytra are dark yellow-brown with legs normal color.

Euphoria fulgida Fab. Used to be common, but have not seen it since 1912.

Euphoria inda Linn. Very common. Closely imitates a bumblebee in flight.

Cremastochilus harrisii Kirby. Common.

Trichius piger Fab. Common and varies considerably in color and markings.

Osmoderma eremicola Knoch. Rare. Have taken several drowned specimens from water tanks.

Osmoderma scabra Beauv. Rather rare. Occurs occasionally at light.

Family SPONDYLIDAE.

Parandra brunnea Fab. Common at light during mid-summer.

Family CERAMBYCIDAE.

Orthosoma brunneum Forst. Not a very common species, but often to be found in open water troughs and tanks.

Prionus laticollis Drury. Scarce. Sometimes found drowned in open water tanks.

Hylotrupes ligneus Fab. Taken rarely on cedar posts.

Phymatodes variabilis Fab. Found commonly under wood-piles The yellow variety is the rarest.

Callidium antennatum Newm. Rare. To be found on new fence posts of cedar.

Callidium janthinum Lec. (?) Very rare. One specimen taken in company with the above June 11, 1912.

Molorchus bimaculatus Say. Common in 1912, but has been rare ever since. Occurs on blossoms of low shrubs.

Euderces picipes Fab. Rare. One specimen taken on shrubbery in July.

Neoclytus capraea Say. Very rare. Found in woodpiles.

Neoclytus erythrocephalus Fab. Not common. To be found on newly erected telephone poles.

Xylotrechus colonus Fab. Rather common. Found in woodpiles.

Cyllene robiniae Forst. Common on golden rod in August.

Plagionotus speciosus Say. Very common during season of 1914. Has caused the death of practically all the maples in the village schoolyard. From my experience I do not think it attacks soft maples.

Desmocerus palliatus Forst. Common. Found on elder shoots early in the spring.

Strangalia luteicornis Fab. Taken on the flowers of low shrubs. Not common.

Strangalia acuminata Oliv. Common. Occurs with the above species.

Gaurotes cyanipennis Say. Very rare. Have taken but one specimen by sweeping.

Typocerus velutinus Oliv. A common species. Found on low shrubs and also on flowers of golden rod.

Leptura pubera Say. Very rare. Took one specimen May 31, 1914, and one on June 14, 1914.

Leptura rubrica Say. Rather rare.

Leptura vittata Germ. Rather rare. Taken in company with the above two species.

Leptura lineola Say. Very rare.

Leptura octonotata Say. Another very rare species. Have taken one Sept. 18, 1910.

Leptura zebra Oliv. Quite common. Found on golden rod.

Leptura cordifera Oliv. Quite rare, but took several specimens in 1914.

Dorcaschema nigrum Say. Very rare. Took one specimen by sweeping foliage of young trees.

Acanthoderes quadrigibbus Say. Quite common on oak.

Toxotus vittiger Rand. Rare. Took several specimens June 21, 1914, on young cedar bushes.

Psenocerus supernotatus Say. Very rare.

Saperda imitans Joutel. Rare. Took one beautiful specimen at light.

Saperda calcarata Say. Rare. Also took one specimen at light.

Saperda tridentata Oliv. Quite rare. Have only one specimen from this vicinity.

Saperda lateralis Fab. Rare. Have one specimen taken June 7, 1914.

Tetraopes canteriator Drap. Common on milkweed.

Oberea ruficollis Fab. Rare.

Oberea ocellata Hald. Also rare. Have but one specimen taken here.

Family Chrysomelidae.

Donacia proxima Kirby. Rare. Occurs on the leaves of the common pond lily.

Donacia subtilis Kunze. Common. Varies in color from bright blue to bright red.

Donacia pusilla Say. Very rare. Occurs on bushes near shores of ponds.

Crioceris asparagi Linn. Generally common.

Crioceris 12-punctatus Linn. About as common as the above species.

Anomoea laticlavia Forst. Rather common. Taken from low shrubbery.

Coscinoptera dominicana Fab. Also taken from low shrubs.

Chlamys plicata Fab. Common. Taken from leaves of blackberry.

Cryptocephalus mutabilis Melsh. Not common.

Cryptocephalus quadruplex Newm. Common. Taken from leaves of blackberry.

Pachybrachys luridus Fab. Not common. To be obtained by sweeping.

Pachybrachys subfasciatus Hald. Found on elm.

Pachybrachys trinotatus Melsh. Very rare. Have one specimen taken July 22, 1912.

Pachybrachys othonus Say. Rather rare. Taken from blackberry bushes.

Pachybrachys picturatus Germ. Common during the last season.

Xanthonia 10-notata Say. Taken by sweeping pasture lands early in the spring.

Glyptoscelis pubescens Fab. Very rare.

Chrysochus auratus Fab. One of the commonest and most beautiful members of the family.

Chrysomela similis Rog. Common. Mostly taken by sweeping.

Chrysomela elegans Oliv. Common.

Calligrapha inornata Rog. Rather rare.

Graphops pubescens Melsh. Common. Occurs on many garden weeds.

Colaspis brunnea Fab. Rare.

Labidomera clivicollis Kirby. Rare. Sometimes found on dandelion blossoms.

Leptinotarsa 10-lineata. This species seems to be on the increase.

Typophorus aterrimus Oliv. Taken by sweeping pastures in early spring.

Typophorus quadriguttatus Lec. Occurs with the above species. Rare.

Typophorus thoracicus Melsh. Very rare. Found with the two above.

Typophorus pumilus Lec. Rare. Have only one specimen taken July 12, 1914.

Plagiodera viridis Melsh. Rare.

Gastroidea polygoni Linn. Common.

Lina tremulae Fab. Very rare. Have one specimen that was taken on sumach.

Lina scripta Fab. Common. Occurs on young willow sprouts.

Lina interrupta Fab. Common. Taken on the wing.

Diabrotica 12-punctata Oliv. Seems to be rare in this vicinity.

Diabrotica vittata Fab. Common. Taken on the blossoms of pear and willow catkins.

Trirhabda canadensis Kirby. Very common.

Syneta ferruginea Germ. Very rare.

Adimonia americana Fab. Commonly found on a species of willow.

Galeruca sagittariae Gyll. Very rare. Have taken several specimens by sweeping low shrubs.

Galeruca notata Fab. Rare. Also taken by sweeping.

Galeruca luteola Schr. Very common.

Blephorida rhois Forst. Not very common.

Disonycha pennsylvanica Ill. Common. Occurs on low plants bordering watering places.

Disonycha caroliniana Fab. Rare. Occurs with above species.

Disonycha triangularis Say. Rare. Occurs in small colonies in pastures.

Epitrix cucumeris Harr. One of our worst cucumber pests.

Chaetocnema obesula Lec. Taken from pasture grass.

Phyllotreta armoraciae Koch. Common. Occurs on horse radish.

Systena taeniata Curt. Rare. Have taken only two or three specimens here.

Systena hudsonias Forst. Very rare. Have one specimen taken August 9, 1910.

Microrhopala vittata Fab. Very common. Occurs on roadside plants in May.

Odontota bicolor Oliv. Rare.

Odontota scapularis Oliv. Very rare.

Odontota rubra Web. Rare but found more frequently than the above two species.

Odontota nervosa Panz. Rather common. Taken by sweeping.
Coptocycla bicolor Fab. Common. Found on the leaves of horse-radish.
Coptocycla clavata Fab. Occurs with the above, but is considerably rarer.
Coptocycla signifera Fab. Very rare. Occurs with the other two species.
Chelymorpha argus Licht. Rather rare in this vicinity. Taken by sweeping low foliage.

Family TENEBRIONIDAE.

Nyctobates pennsylvanica DeG. Common. Occurs beneath the bark of maple and elm.
Upis ceramboides Linn. Quite rare in this vicinity.
Scotobates calcaratus Fab. Rare. Taken at light.
Opatrinus notatus. Common under stones the year round.
Xylopinus aenescens Lec. Not rare. Occurs on foliage of elder and other small trees.
Tenebrio molitor Linn. Common.
Tenebrio tenebrioides Beauv. Not as common as the above species.
Tenebrio castaneus Knoch. Quite rare in this vicinity.
Helops micans Fab. Rare.
Haplandrus femoratus Fab. Rare. Found under stones.
Diaperis maculata Oliv. Common. Found in fungi on elm and maple.
Hoplocephala bicornis Oliv. Common. Found under bark of maple occasionally.
Blapstinus metallicus Fab. Rare in this vicinity.

Family CISTELIDAE.

Isomira quadristriata Coup. Occasionally taken by sweeping.

Family MELANDRYIDAE.

Melandrya striata Say. Rare.

Family OEDEMERIDAE.

Asclera ruficollis Say. Rare. Taken from blossoms of dandelion.

Family MORDELLIDAE.

Mordella marginata Melsh. Common. Taken from white daisy.
Mordellistena comata Lec. Also occurs on white daisy, but is rare.

Family ANTHICIDAE.

Notoxus bifasciatus Lec. Occurs on the common milkweed.
Notoxus monodon Fab. Also occurs on milkweed and is the more common of the two species.

Family PYROCHROIDAE.

Pyrochroa flabellata Fab. Rare. Took about ten specimens at sugar last year.

Family MELOIDAE.

Meloe americanus Leach. Rare. Have one specimen taken in May and one taken in September.

Pomphopoea aenea Say. Quite common on the blossoms of wild pear.

Epicauta marginata Fab. Not common.

Epicauta pennsylvanica DeG. Usually very common.

Epicauta cinerea Forst. Was very common last year on huckleberry bushes.

Family RHIPIPHORIDAE.

Myodites fasciatus Say. Rare. Occurs in sandy places.

Family RHYNCHITIDAE.

Rhynchites bicolor Fab. Occurs on the wild rose.

Family ATTELABIDAE.

Attelabus analis Ill. Also occurs on the wild rose.

Family OTIORHYNCHIDAE.

Aphrastus taeniatus Gyll. Rare.

Pandeletejus hilaris Hbst. Common. Beaten from branches of oak.

Family CURCULIONIDAE.

Phytonomus nigrirostris Fab. Common.

Phytonomus meles. Also very common. Most specimens taken on the wing.

Ithycerus noveboracensis Forst. Beaten from oak branches. Rather rare.

Stephanocleonus plumbeus Lec. Very rare. Taken from railroad track, where it closely resembles small stones.

Lixus concavus Say. Quite common on dock. Holds tenaciously to anything with which it comes in contact.

Tyloderma foveolatum Say. Common on garden weeds.

Rhyssematus lineaticollis Say. Common.

Mononychus vulpeculus Fab. Found on mullein.

Coeliodes acephalus Say. A most common species on mullein.

Centrinus scutellum-album Say. Occurs on many small plants.

Otidocephalus chevrolatii Horn. Rare.

Family CALANDRIDAE.

Cossonus corticola Say. Rather rare. Taken under bark of elm log.

Rhodobaenus tredecimpunctatus Ill. Very rare. Have not seen this species for two years.

Sphenophorus pertinax Oliv. Rare.

Sphenophorus parvulus Gyll. Not as rare as the above.

Family SCOLYTIDAE.

Hylesinus aculeatus Say. Very rare.

Dendroctonus terebrans Oliv. Taken from cedar posts of Lepidoptera cage before mentioned.

Description of a New Coleophora Moth and Note on a Synonym (Lep.).

By WILLIAM WILD, East Aurora, N. Y.

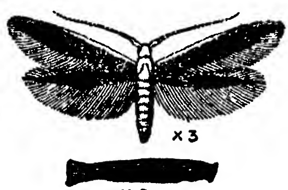
Coleophora albiantennaella n. sp.

Expanse 12 to 13 mm.

Head, palpi, antennae and thorax, pale ochreous-white; palpi slightly tufted; antennae not annulated, basal joint thickened; legs pale ochreous-white.

Forewings: coarsely covered with grayish-brown scales, becoming darker in apical third. A broad white streak extending along costal margin from base to cilia. Cilia light gray.

Hindwings: very light grayish-brown, cilia concolorous.



Coleophora albiantennaella and larval case.

Locality: Buffalo, New York. *Cotypes,* two, in my collection, but they may eventually be placed in the United States National Museum.

Two specimens bred from larvae feeding on the under side of leaves of dogwood. Larvae taken June 12th. Imagos issued July 20th and 30th.

Larva: length 5 mm. Cylindrical, reddish-brown. Head black. Prothoracic and mesothoracic shields black, divided by a light dorsal line; a lateral black spot on each thoracic segment. Thoracic legs black. Anal plate black.

Case: length 11 mm. Grayish-brown, cigar-shaped, a trifle compressed laterally. Mouth opening oblique, slightly flared. Posterior end dilated, flattened and square-ending.

Coleophora auropurpuriella Cham.

C. auropurpuriella Cham. is a synonym of *C. corruscipennella* Clem. according to Chambers' own correction in the Can. Ent., VII, 124, 1875, which has been overlooked in Dr. Dyar's list and in Smith's list, probably on account of not being included in the index of this volume.

NEW HETEROCERA—HAIMBACH.

New Heterocera (Lep.).

By FRANK HAIMBACH, Philadelphia, Pa.

(Plate XII.)

Epimecis carbonaria n. sp. (Plate XII, fig. 1).

Alar expanse 41 to 48 mm. Entire upper surface of wings smoky black. Primaries with a white, dentate submarginal line, bordered on both sides with intense black; transverse posterior line also white, dentate, with intense black ornamentation, on submarginal line the dark ornamentation is more conspicuously inwardly; there is an intense black reniform spot, from which issues an indistinct line, running to interior margin.

Secondaries: median and marginal lines meet the lines on primaries, and in the middle of marginal line, the tooth is ornamented inwardly with a while lunule; the discal spot is black.

Under side of wings, lighter than above; markings the same as above, but less distinct; one specimen before me shows only a slight indication of the lines.

Described from six specimens, five taken at Roxborough, Philadelphia, Pa., V, 21, 09; VI, 7; VI, 21; VII, 2, 11, and X, 1, and one specimen taken at Glenolden, Pa., without date.

The species is closely allied to *E. virginaria* Cramer, but can be readily separated by its much darker color.

Pyrausta jamaicalis n. sp. (Plate XII, fig. 2).

Alar expanse 28 mm. Head, thorax and abdomen bronze brown above, the abdomen with a broad whitish stripe, covering all but anal segment.

Wings of uniform bronze brown color, showing an iridescent lilac color on the light markings. Shape of wings as in *P. pertextalis* Lederer and *P. aeglealis* Walker.

The markings on primaries are of a smoky grey color, and cover nearly two-thirds of wings; the submarginal line is shaped like a sickle, with handle toward inner margin; inwardly from this line there is a large dark brown spot on the light surface somewhat in the shape of a two-pointed flag or pennant, which emanates from the costa, then a perfectly straight line reaching from the costa to inner angle, then a basal line within which is an irregular dark brown blotch to base.

Secondaries with zigzag median line and prominent discal spot in dark brown oval.

Underside, wings as above; thorax and abdomen ochraceous, legs ochraceous beneath, dark brown above, annulated on the tarsi.

Described from one female specimen, taken at Montego Bay,

Jamaica, British West Indies, XI, 2, 13, by Mr. Morgan Hebard, and kindly presented to me by Mr. George M. Greene.

Pyrausta huachucalis n. sp. (Plate XII, fig. 3).

Alar expanse 18 mm. Primaries purple lake, a white submarginal line, dentate in shape, and a similar line near middle of wing running parallel with submarginal line; the costa has a row of small black dots, beginning at the line near middle and extending outwardly and along exterior margin.

Secondaries smoky white, without any markings, lighter basally.

Cilia of all wings smoky white, with a row of dots of brown running through centre, forming a dark line.

Two specimens, Miller's Canyon, Huachuca Mountains, Arizona, July, 1907, Wenzel & Kaeber.

The nearest species to this in wing form is *P. illibalis* Huebner, though otherwise it bears no resemblance to it. It is with some reluctance that I describe this species under the genus *Pyrausta,* as perhaps when the genus is revised and subdivided, this may fall into another closely allied genus.

Hymenia kaeberalis n. sp. (Plate XII, fig. 4).

Alar expanse 19 to 20 mm. Upper surface of wings very dark brown, irrorate.

Primaries: a white lunular spot at one-third from exterior margin, and a zigzag white spot at one-third from base, both enclosed with black lines.

Secondaries with irregular median and marginal lines, between which the space is much lighter than the rest of wing, really approaching white.

Cilia brown, with a row of dark spots running through them, forming a line, except at inner angle, there is a white spot formed by that part of cilia.

Under side of wings like upper, but more sharply defined, making the contrast of colors greater.

Described from ten specimens taken at Miller's Canyon, Huachuca Mountains, Arizona, in July, 1907.

It gives me pleasure to dedicate this species to Mr. H. A. Kaeber, who in company with Mr. H. A. Wenzel, collected this and many other interesting species in the Summer of 1907.

Diathrausta daeckealis n. sp. (Plate XII, fig. 5).

Alar expanse 13 mm. Upper and under surface of wings black.

Primaries: a faint white line from costa to middle of wing, at about

one-fourth from outer margin; another very faint white curved line from costa to interior margin, which line meets a similar line on secondaries, which is also curved, and which together form a symmetrical curved line on each side of the insect.

On the under side the curved line of primaries is not visible, otherwise the marking is the same as above.

There is a large white spot in the cilia of upper wings, rest of cilia black.

Brown's Mills Junction, New Jersey, VI, 22, 1907, collected by Mr. E. Daecke, for whom it gives me pleasure to name this species.

This insect resembles *D. reconditalis* Walker, but can be easily recognized by the absence of the white spots on the former, and by the very regular lines, while in *reconditalis* the lines are irregular, also by the lines in secondaries being much nearer the apex in *daeckealis* than in *reconditalis*.

Diathrausta montana n. sp. (Plate XII, fig. 6).

Alar expanse 19 to 22 mm. Closely related to *D. reconditalis* Walker, but much larger, the alar expanse of *reconditalis* being only 13 to 15 mm.; besides the difference in size, the markings are much more pronounced in *montana*, particularly in the hind wings, where there is a line reaching from near costa to hind margin, and another line outward from this line, reaching almost half-way across wing.

Described from four specimens, Chimney Gulch, Golden, Colorado, VI, 3, and VI, 15, 1907.

I have many specimens of *reconditalis*, and from many localities, and I cannot find one specimen to form a connecting link between these species; there are no intergrades.

Galasa fulvusana n. sp. (Plate XII, fig. 7).

Alar expanse 24 mm. A near ally to *G. rubidana* Walker; the points of difference are the following: *fulvusana* is larger than the largest specimens of *rubidana,* and the color is not bright red as in *rubidana,* but is fulvous.

Rubidana has white lines emanating from costal fold and forming a circular spot in well marked specimens, while *fulvusana* has a line running from same place at costa to hind margin of wings, not circular, and overlaid with black scales.

One specimen, Miller's Canyon, Huachuca Mountains, Arizona, July, 1907, Kaeber and Wenzel.

Crambus carolinellus n. sp. (Plate XII, fig. 8).

Alar expanse 19 to 20 mm. A clean-cut, little species, very similar in marking to *C. alboclavellus* Zeller, but smaller and color more distinct, in that the dark brown marking on the white wings forms a contrast which is not apparent in *alboclavellus.* The dark brown line at junction of tooth and the subterminal line are much closer together than in *alboclavellus,* and the white spot between these lines, which is the continuation of the stripe forming the tooth, is therefore shorter and more intense. This little species is constant insofar as the specimens before me are concerned, all being of uniform size and color; there is only 1 mm. difference between the largest and smallest specimens. *Alboclavellus* is a very variable species; specimens taken in one day and at the same place will often show quite a variety of colors and sizes. This difference in size, and the lines being closer together on the primaries, I believe, will justify the establishing of the species *carolinellus.*

Fourteen specimens taken at Black Mountains, North Carolina, VI, 25, to VII, 20, 1912, by Mr. William Beutenmueller.

Crambus lyonsellus n. sp. (Plate XII. fig. 9).

Alar expanse 21 mm. In color and marking nearest to *C. pascuellus,* with the following points of difference: in *pascuellus* the white line on primaries runs along costa, and at nearly one-half from apex, it turns away inwardly and forms a well-defined rounded point, while in *lyonsellus* the white line is wider, and runs along costa about three-fifths from apex, and makes an acute turn, forming a tooth. The subterminal line of *lyonsellus* is less angular than that of *pascuellus;* it arises nearer the apex than in *pascuellus,* thereby reducing the degrees of the angle.

Two specimens, Katonah, Westchester County, New York, June and July, W. Beutenmueller.

It gives me much pleasure to dedicate this species to Mr. Frank D. Lyons, who has helped me very considerably in the last two years to build up my collection of Lepidoptera.

Amorbia wenzelana n. sp. (Plate XII, fig. 10).

Alar expanse 29 mm. Primaries brownish grey, with a reddish hue, which is most pronounced on the outer half of interior margin. There is a transverse line emanating from costa, about one-third from base, and running outwardly to about one-half of interior margin, two dark brown blotches at costa, one along the line above referred to, and extending about two-fifths of its length, the other a kidney-shaped spot at costa; there are several irregular lines at exterior margin. Cilia reddish.

Secondaries brick red, void of any ornamentation. Cilia dark brown.

One female taken at Miller's Canyon, Huachuca Mountains, Arizona, in July, 1907.

It is with pleasure that I name this species for Mr. H. A. Wenzel, who, in company with Mr. H. A. Kaeber, collected many interesting Lepidoptera during their sojourn in the Huachucas, and which I was fortunate enough to obtain from them.

The species is closest to *A. humcrosana* Clemens.

Anaphora busckella n. sp. (Plate XII, fig. 11).

Alar expanse 33 mm. Primaries dark brown, with a violaceous tinge, a broad white stripe, also violaceous, at interior margin, speckled with dark brown irrorate spots. There are several blackish spots above the light stripe, the centre one of which partly covers the light stripe.

Secondaries and cilia dark smoky brown.

Under sides of wings uniformly dark smoky brown, without any ornamentation.

One female taken at Jamesburg, New Jersey, July 4th.

I am pleased to dedicate this distinct species to Mr. A. Busck, who kindly determined the genus for me, and in many other determinations gave me valuable assistance.

The types of all the species here described are in the author's collection.

EXPLANATION OF PLATE XII.

1. *Epimecis carbonaria* n. sp.
2. *Pyrausta jamaicalis* n. sp.
3. *Pyrausta huachucalis* n. sp.
4. *Hymenia kaeberalis* n. sp.
5. *Diathrausta daeckealis* n. sp.
6. *Diathrausta montana* n. sp.
7. *Galasa fulvusana* n. sp.
8. *Crambus carolinellus* n. sp.
9. *Crambus lyonsellus* n. sp.
10. *Amorbia wenzelana* n. sp.
11. *Anaphora busckella* n. sp.
12. *Haemotopsis grataria* Fab., var. *annettaria* Haimbach.

A New Genus of Chalcidine Hymenoptera.

Doctor Luigi Masi, in his "Contribuzioni alla conoscenza dei Calcididi Italiani" (Boll. Lab. di Zool. generale e agraria della R. Scuola Superiore d'Agricoltura in Portici, 1908, III, pp. 106-108, figs. 11 to 13) describes *Chalcis modestus* Masi, giving figures which show that the hind femur bears one large tooth beneath, somewhat beyond the proximal half, followed by *many minute, comblike* teeth as in *Stomatoceras* Kirby. Thus, the dentation is totally different from that occurring in *Chalcis* and I therefore erect the **new genus Hypochalcis** for the species *Chalcis modestus* Masi in the tribe Chalcidini. The genus is similar to *Chalcis* in other respects, the scutellum unarmed at apex, the antennae 13-jointed.—A. A. GIRAULT, Washington, D. C.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., JULY, 1915.

A Contrast and a Hope.

The Summer of 1915. Instead of an International Congress of Entomology, repeating the social intercourse, the making of new friendships, the reaching of hands across the sea, of Brussels and of Oxford, an International War with Entomologists serving in the opposing lines. *Then,* the increased forbearance, sympathy and understanding that comes from personal acquaintance; *now,* the intensifying of those racial and national prejudices which influence even those who strive against them and who know their baleful effects. Only in the far West of America will there be, this Summer, a shining ray of hope in the assembling of those who cultivate insect lore. The additional meeting of the Entomological Society of America (the announcement of which is made on another page of this number of the NEWS), instead of competing with the Congress planned for Vienna, will be the only general gathering where entomologists of all nations may meet under a neutral flag in the peace of science. To California comes the opportunity of raising the torch of knowledge far above and away from the din and smoke of strife. May the whole earth know again some of that peace which it enjoyed before these terrible present days!

We learn, through the *Entomologists' Record,* that Dr. Walther Horn, the eminent German Coleopterist, is at the front somewhere as a Regimental Doctor.

Blood Worms and Water Pollution (Dip.).

The presence of "blood-worms" [of which the most common species in the United States are the larvae of *Chironomus decorus, viridicollis* and *lobiferus*] in any body of water is not an indication that such water is polluted, although they may be, and often are, found in water that is contaminated with sewage. There are, however, but few species to be found in badly polluted water, most species being confined to unpolluted water or to that which is but slightly tainted. Even blood-red larvae are not in all cases found in polluted water, as the two largest species in the Illinois are confined to the parts of the river which are comparatively clean.—J. R. MALLOCH, Bull. Ill. St. Lab. Nat. Hist., x, p. 534, 1915.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Observations on Colias interior Scudder (Lepid.).

For the past two summers I have been on a small island off the Maine coast. It is two miles from Mount Desert, which, in turn is half a mile from the mainland at the nearest point. It is a most delightful island, and if it were not for the frequent and sometimes long-lasting fogs, would be an ideal place in every way.

During the summer of 1913 I caught my first specimen on July 10, and in the past summer of 1914, on July 12. The first to emerge are in most cases unusually large and deeply-colored males. The first specimen had extremely dark yellow wings and very deep black borders. The under sides were deep orange, with one very bright pink ocellus on the secondaries.

The first few males showed signs of great sluggishness in their flight. They hardly ever flew more than twenty or thirty yards, and then only when they were disturbed, and in a very leisurely manner. About two days later I captured the first female of the season. They were also very slow fliers for the first day, but a day later, both males and females flew quite swiftly and made their capture quite a difficult matter, for they would not remain quiet on the approach of the collector. From about July 18th to the 21st I saw and caught only females. The males seemed to have entirely disappeared. From then to July 26th I caught about an equal number of each sex. Then from the 27th of July they began to diminish in numbers very rapidly, until on the 6th of August I caught my last specimen, a very much battered, light-colored female. The previous summer I captured the last specimen I saw, likewise a female, on the 4th of August. The first females, like the first males, were much darker in color than the average of those I caught. About the end of July I caught an almost entirely white female.

I was very much interested to notice that of the four small surrounding islands only two had *C. interior* (during both summers). And in only certain sections on Mt. Desert Island could I find any specimens at all. Another curious fact I noticed was that at first I captured my specimens in the open meadows, while later on I caught *C. interior* only in open glades or fields surrounded by woods.

The following is a table showing approximately the relative number of males and females of *C. interior* as observed during the two summers of 1913 and 1914:

Approximate dates	Males	Females
July 10-12	first one	none
" 12-14	few	first one
" 14-18	many	few
" 18-21	none	many
" 22-26	many	many
" 27-August 4	decreasing	
August 4-6	none	last

ARTHUR H. NAPIER, *Haverford, Pa.*

The Entomological Society of America—Announcement of Summer Meeting, San Francisco, California, August, 1915.

Despite the long way to go entailed by a trip from the East or Middle West to the Pacific Coast, the coming summer is the special time of all times for members of the Entomological Society of America to undertake the journey. The meeting of the Society in the first week of August at Berkeley (University of California) and Palo Alto (Stanford University), in conjunction with the simultaneous meetings of the American Association for the Advancement of Science, and affiliated societies, might well be sufficient incentive and reason for the expedition, but when there is added the special opportunity to see at the same time some of the beauties and become acquainted with some of the fascinating entomological conditions of the Pacific Coast, and to visit an international exposition of unusual picturesqueness and extent, then the incentive should become simply compelling. The half-fare railway rate, with different going and returning routes permitted, should help make the compulsion one easy to submit to.

The Pacific Coast members of the Society, therefore, earnestly invite and urge their fellow-members from "The States" to come to California and to the summer meeting, and they promise, all and severally, to do what they can to help make the long journey worth while. The University of California will maintain an "entomological camp" on the shores of beautiful Lake Tahoe, which lies in the Sierra Nevada just where one of the trans-continental railway lines crosses the divide. There will be a warm welcome at the camp for any entomologist who cares to stop off, coming or going, to stay a few days in this unexcelled collecting region. The collections of Stanford University and the University of California, as well as several notable private collections of Pacific Coast insects, will be constantly accessible to all visiting entomologists. Several collecting excursions, reaching a wide variety of insect habitat, (seashore, salt-marsh, foothill, mountain, desert and fertile valley) are planned.

Finally, as to papers to be presented at the meeting, the Pacific Coast members will be quite willing to allow their eastern colleagues to provide most of this part of the entertainment, but nevertheless will be willing to do their share. Their contributions will especially concern the problems of insect occurrence and distribution, ecologic relation and economic bearing, presented by Pacific Coast and Pacific Island biologic conditions. The temporary secretary would be glad to receive communications concerning proposed papers.

We shall be glad to send to any interested member of the Society a copy of the information pamphlet of the Pacific Coast Committee of the A. A. A. S., in which will be found much practical information that will be of use to members contemplating coming West this summer. It would be a special favor to us if members of the Society intending to attend the summer meeting would inform us (addressing Dr. E. C. Van Dyke, University of California, Berkeley, California), in advance. This information will aid us materially in making hotel arrangements, planning excursions, etc.

The blanks giving titles of papers and exhibits for the meeting should be sent to the Temporary Secretary, Dr. E. C. Van Dyke, University of California, Berkeley, California, and the nominations of new members should be sent to the Secretary-Treasurer at the University of Illinois, Urbana, Ill.—VERNON L. KELLOGG, *President;* ALEX. D. MACGILLIVRAY, *Secretary-Treasurer;* E. C. VAN DYKE, *Temporary Secretary.*

Lycaena argiolus in America. (Lep.).

I believe the multiplicity of names we have in this country ranged under *Lycaena pseudargiolus* Bdl.-Lec. only represent varieties of the European and Asiatic *argiolus*. I would list them as follows:

Argiolus Linn.
- var. **pseudargiolus** Bdl.-Lec. (1833)
  - *neglecta* Edw. (1862)
- var. **lucia** Kirby (1837)
  - *violacea* Edw. (1866)
  - *marginata* Edw. (1883)
  - *cinerea* Edw. (1883)
  - *fumida* Scudder (1889)
  - *pseudora* Scudder (1889)
  - *argentata* Fletcher (1903)
  - *quesnellii* Cockle (1910)
  - *intermedia* Streck. (1878)
- var. **nig** Streck. (1878)
  - *nigra* Edw. (1884)
- var. **echo** Edw. (1864)
  - *arizonensis* Edw. (1884)
- var. **nigrescens** Fletcher (1903)
- var. **gozora** Boisd. (1870)

Piasus of Boisduval does not belong in this list, as it represents a distinct species of which *sagittigera* of Felder is a synonym. *Pseudargiolus* and *neglecta* are the same thing, as may be seen by examining Mr. Edwards' figures of the two. It is variable in size and the different sizes fly together in the same locality at the same time. *Neglecta* was named from the smaller individuals. *Lucia* is the form from wintering chrysalids and *violacea* represents the darker examples and *marginata* the ones that have the spotting a little less dense in the centre of the underside of the inferior wings. *Quesnellii* has the spots "dark chocolate brown" on the underside. *Nig* is the black or dark brown form and *intermedia* when they are not quite so dark. Mr. Edwards found only males of this but both sexes are probably represented. *Cinerea* is small and grey underneath. *Argentata* is slightly silvery below like some specimens of *argiolus*. *Gozora* is the common form found south of the United States. *Echo* is the Pacific Coast form and the Arizona specimens are often quite dark in color. *Nigrescens* is the Pacific Coast form from wintering chrysalids.

I see no advantage in retaining so many names for slight differences, as they are very confusing and often take many hours of patient study to find out what they mean. Many more names of equal value to those already proposed could be given but they would only add to the confusion. I have accepted the genitalic work of Mr. R. C. Williams, Jr., who says that *pseudargiolus* and *argiolus* have identical genitalic structures and he believes they are one species.—Henry Skinner.

The Thomas Say Foundation.

The Entomological Society of America at its Philadelphia meeting, in December, 1914, established the Thomas Say Foundation for the publication of works dealing with American insects. These works are to be limited to those of a monographic or bibliographic character and to be of such size as to make a separate volume of one hundred or more pages. J. M. Aldrich, Nathan Banks, E. P. VanDuzee, Morgan Hebard (Treasurer) and Alex. D. MacGillivray (Editor) were

appointed a temporary committee with power to solicit funds, to choose works for publication, to determine the form of the publication, and to print such volumes for which the committee has funds and which it considers worthy of publication.

The committee on publication must have funds before the publication of such a series of volumes can be inaugurated. With the consent of the Executive Committee of the Entomological Society of America, the committee of the Thomas Say Foundation are sending the following appeal and proposition to the members of the Society.

It is agreed that those persons who will make a preliminary subscription of ten dollars ($10.00) towards the Thomas Say Foundation are to be considered charter subscribers and are to receive such volumes as the Foundation may issue, equivalent to the amount of their subscription. The Executive Committee of the Entomological Society of America also authorizes the publication committee of the Thomas Say Foundation to guarantee to those persons making a subscription of ten dollars, that in case no volumes of the Thomas Say Foundation are issued, they shall be freed from the payment of all annual dues to the Entomological Society of America for a period of five years or for an amount equivalent to their subscription.

It is hoped that all persons who are interested in the development of such a series of monographs and catalogues of American insects as is contemplated in the Thomas Say Foundation will aid the Committee.—MORGAN HEBARD, *Treasurer*, Chestnut Hill, Phila., Pa.; ALEX. D. MACGILLIVRAY, *Editor*, 603 W. Michigan Avenue, Urbana, Ill.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

1—Proceedings, The Academy of Natural Sciences of Philadelphia. **4**—The Canadian Entomologist. **5**—Psyche. **6**—Journal of the New York Entomological Society. **9**—The Entomologist, London. **10**—Nature, London. **11**—Annals and Magazine of Natural History, London. **21**—The Entomologist's Record, London. **36**—Transactions, Entomological Society of London. **40**—Societas Entomologica, Zurich. **47**—The Zoologist, London. **50**—Proceedings, U. S. National Museum. **68**—Science, New York. **75**—Annual Report, Entomological Society of Ontario, Toronto. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **104**—Mitthei-

lungen, Naturhistorisches Museum in Hamburg. **166**—Internationale Entomologische Zeitschrift, Guben. **173**—Die Grossschmetterlinge der Erde, Fauna Americana, von A. Seitz, Stuttgart. **176**—Archiv fur entwicklungsmechanik der Organismen, Leipzig. **184**—Journal of Experimental Zoology, Philadelphia. **189**—Journal of Entomology and Zoology, Claremont, Calif. **193**—Entomologische Blatter, Cassel. **242**—Transactions, The Royal Society of Canada (3d Series), Ottawa. **291**—Proceedings of the Staten Island Association of Arts and Sciences, Lancaster, Pa. **303**—Entomologiske Meddelelser, udgivne af Entomologisk Forening, Copenhagen. **322**—Journal of Morphology, Philadelphia. **324**—Journal of Animal Behavior, Cambridge. **411**—Bulletin, The Brooklyn Entomological Society. **420**—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington. **438**—Bulletin of the Illinois State Laboratory of Natural History, Urbana. **447**—Journal of Agricultural Research, Washington. **507**—Occasional Papers, Museum of Zoology, University of Michigan. **508**—Compte Rendu, Seances de la Societe de Physique et d'Histoire Naturelle de Geneve. **509**—Revue Generale des Sciences pures et Appliquees, Paris. **510**—Sitzungsberichte, Heidelberger Akademie der Wissenschaften.

GENERAL SUBJECT. **Anon.**—The Thomas Say Foundation, **68,** xli, 784-5. **Bethune-Baker, G. T.**—The development of clasping organs in insects, **36,** 1914, cxx-clxviii. **Brues & Melander**—Key to the families of North American insects. An introduction to the classification of insects, 140 pp., 1915. **Buddenbrock, W.**—Ueber das vorhandensein des lichtruckenreflexes bei insekten sowie bei dem krebse Branchipus grubei, **510,** 1915, Ab. 1, 10 pp. **Fabre, J. H.**—(See Lochhead, W.). **Fantham, H. B.**—Insect pests and war, **10,** xcv, 265-6. **Grossbeck, J. A.**—Obituary notice by W. T. Davis, **291,** v, 13. .**Lochhead, W.**—Jean Henri Fabre, the French entomologist, **75,** 1914, 61-70. **Luderwaldt, H.**—Insekten- und sonstiges tierleben an brasilianischen Bromeliaceen, **92,** xi, 78-84. **Lyman, H. H.**—Biographical note and list of published papers by C. J. S. B., **75,** 1914, 118-21. **Rivers, John J.**—Biographical note by F. Grinnell, Jr., **189,** vi, 98. **Saunders, William**—Biographical note by C. J. S. B., **75,** 1914, 121-3. **Sjostedt, Y.**—La construction des nids chez les insectes, **509,** xxvi, 85-90. **Wheeler, G.**—A "priority" note, **21,** **1915, 60.**

PHYSIOLOGY AND EMBRYOLOGY. **Payne, F.**—Chromosomal variations and the formation of the first spermatocyte chromosomes in the European earwig, Forficula sp., **322,** xxv, 559-85.

MEDICAL. **Anon.**—House-flies as carriers of disease, **10,** xcv, **289-92.**

ARACHNIDA, ETC. Banks, N.—Two Mexican myrmecophilous mites, **5,** 1915, 60-1.

Banks, N.—New Acarina [9 new], **189,** vi, 55-66. **Moles, M. L.**—A pseudoscorpion from poplar trees, **189,** vi, 81-3.

NEUROPTERA, ETC. Hilton, W. A.—The nervous system of Neanura gigantea, **189,** vi, 95-7. **Hood, J. D.**—Hoplothrips corticis: a problem in nomenclature, **9,** 1915, 102-7. **Kellogg & Nakayama**—A new Trichodectes from the goat, **5,** 1915, 33-5.

Bacon, G. A.—A new sp. of Tullbergia [collis.], **189,** vi, 84-5. **Esben-Petersen, P.**—A synonymic list of the order Mecoptera together with descriptions of n. sps., **303,** 1915, 216-42. **Gardner, R. E.**—Some notes on the distribution of Cinura in the vicinity of Claremont, with description of a n. sp., **189,** vi, 86-92. **Hood, J. D.**—Descriptions of new American Thysanoptera [20 new], **420,** iii, 1-40. **Lloyd, J. T.**—Notes on Astenophylax argus, **6,** 1915, 57-60. **Williamson, E. B.**—Notes on Neotropical dragonflies or Odonata, **50,** xlviii, 601-38.

ORTHOPTERA. Caudell, A. N.—Podisma frigida in Alaska, **4,** 1915, 160. Dendrotettix quercus Packard, **5,** 1915, 52-4. **Davis, W. T.**—Dendrotettix quercus at Yaphank, Long Island, N. Y., **411,** x, 33-4. **Morse & Hebard**—Fixation of single type (lectotypic) specimens of species of American O., **1,** 1915, 96-106.

HEMIPTERA. King, G. B.—The tenth California Kermes, **189,** vi, 100-1.

Davis, W. T.—Notes on some Cicadas from the Eastern and Central U. S., with description of a new variety of C. pruinosa; new sps. from California and Utah [7 new], **6,** 1915, 1-10; 11-21. **Essig, E. O.**—The second Protodiaspis [agrifolia], **189,** vi, 76-80. **Olsen, C. E.**—A capsid new to our fauna, **411,** x, 34-5. **Van Duzee, E. P.**—A preliminary review of the west coast Cicadidae [1 new gen., 9 n. sps.], **6,** 1915, 21-44. **Woodruff, L. B.**—A new Membracid from N. Y., **6,** 1915, 44-7.

LEPIDOPTERA. Anon.—Grundlagen der namensgebung, **166,** ix, 13-14 (cont.). **Bandermann, F.**—Aberrative formen und albinismus bei tagfaltern, **40,** xxx, 18-19. **Callard, M.**—Appetite of slugs for green material, **47,** 1915, 159. **Fielde, A. M.**—A new hypothesis concerning butterflies, **1,** 1915, 93-5. **Forbes, W. T. M.**—Slides of wings of Macrolepidoptera, **6,** 1915, 69-70. **Fruhstorfer, H.**—Ein neues abdominalorgan der Rhopalocera, **40,** xxx, 23. **Gibson, A.**—Variation in the color of the blisters of the hedge-hog caterpillar (Isia isabella), **75,** 1914, 117. **Glaser, R. W.**—Wilt of gipsy-moth caterpillars, **447,** iv, 101-28. **Hargitt, C. W.**—Observations on the behavior of butterflies, **324,** v, 250-7. **Pierce & Metcalfe**—An easy

method of identifying the species of the genus Cnephasis = Sciaphila, **21**, 1915, 99-102. **Pictet, A.**—Reactions thermotropiques chez les insectes (Resume), **508**, xxxi, 54-6. **Reverdin, J. L.**—A hitherto unknown organ in the ancillary appendages of the L., **21**, 1915, 97-8. **Rippon, C.**—The rearing of larvae with special reference to the British L., **9**, 1915, 112-16 (cont.). **Simms, H. M.**—Notes on the cause of the blue coloration of the blue Lycaenids, **4**, 1915, 161-5. **Turner, H. J.**—Gynandromorphs and sex, **21**, 1915, 58-60. **Watson, F. E.**—Some miscellaneous local records of L., **6**, 1915, 70-1.

Schaus, W.—Notes on Costa Rican Heterocera described in the "Annals and Magazine of Natural History," **11**, xv, 501-2. **Seitz, A.**—Syntomidae, **173**, Lief. 62, 33-40. **Swett, L. W.**—Geometrid notes—new sps. and varieties [3 new], **4**, 1915, 155-8.

DIPTERA. **Hewitt, C. G.**—Observations on the feeding habits of the stable fly, **242**, viii, 37-42. **Johnson, C. W.**—A fly [Rhyphus fenestralis ?] preserved in paper [since 1773], **5**, 1915, 63.

Bergroth, E.—Some Tipulid synonymy, **5**, 1915, 54-9. **Cockerell, T. D. A.**—A fossil fungus-gnat, **4**, 1915, 159. **Felt, E. P.**—Aplonyx sarcobati n. sp., **189**, vi, 93-4. **Johnson, C. W.**—A new sp. of Pseudotephritis, **5**, 1915, 49. **Knab, F.**—Some West Indian D., **420**, iii, 46-50. **Kroler, O.**—Beitrage zur kenntnis der Thereviden und Omphraliden [13 new sps.], **104**, xxxi, Beitr. 2, 29-74. **Malloch, J. R.**—The Chironomidae, or midges, of Illinois, with particular reference to the species occurring in the Illinois River [many new], **438**, x, 275-543. **Smith, H. E.**—A new genus of Tachinidae from the Canadian Northwest, **4**, 1915, 153. **Townsend, C. H. T.**—New Masiceratidae and Dexiidae from So. America, **6**, 1915, 61-8. An Acalyptrate genus of Muscoidea; A polistiform genus of Muscoid flies; A genus of Hystriciinae flies with white maggots, **420**, iii, 41; 43-44; 45-6.

COLEOPTERA. **Frost, C. A.**—June collecting in Maine, **4**, 1915, 141-5. **Hyslop, J. A.**—Observations on the life history of Meracantha contracta, **5**, 1915, 44-8. **Weiss, H. B.**—Notes on some tropic reactions of Macrodactylus subspinosus, **4**, 1915, 152. **Wheeler & Williams**—The luminous organ of the New Zealand glow-worm, **5**, 1915, 36-43.

Arrow, G. J.—Notes on the coleopterous family Dermestidae, and descriptions of some new forms in the British Museum, **11**, xv, 425-51. **Knaus, W.**—Collecting notes on Kansas C., **411**, x, 35-40. **Leng & Shoemaker**—A new genus and species of Lampyridae, **6**, 1915, 55-6. **Schaeffer, C.**—New Coleoptera and miscellaneous notes [7 new names]; Change of generic names, **6**, 1915, 47-55; 68-9. **Van Dyke, E. C.**—Some new beetles in the families Osto-

midae (Trogositidae) and Cleridae from California [5 new], **411,** x, 25-33. **Wichmann, H.**—Zur kenntnis der Ipiden; III, **193,** 1915, 102-7.

HYMENOPTERA. **Boveri, Th.**—Ueber die entstehung der eugsterschen zwitterbienen, **176,** xli, 264-311. **Davis, W. T.**—A Long Island ants' nest 18 feet in diameter, **6,** 1915, 69. **Fielde, A. M.**—On certain vesicles found in the integument of ants, **1,** 1915, 36-40. **Nicholson, C.**—Hibernation of Vespa vulgaris, **21,** 1915, 115-6. **Rau, P.**—The differentiation of the cocoons of Pelopoeus caementarius and Chalybion caeruleum, **5,** 1915, 62-3. The ability of the mud-dauber to recognize her own prey, **324,** v, 240-49.

Crawford, J. C.—Descriptions of new H., No. 9 [9 new], **50,** xlviii, 577-86. **Gaige, F. M.**—The Formicidae of Charity Island, Lake Huron, **507,** No. 5, 29 pp. **Mann, W. M.**—A new form of a Southern ant from Naushon Island, Massachusetts, **5,** 1915, 51. **Wheeler, W. M.**—Neomyrma versus Oreomyrma, **5,** 1915, 50.

Doings of Societies.

Entomological Section, Academy of Natural Sciences, Philadelphia.

Meeting of May 27, 1915. Mr. Philip Laurent, Director, presided. Ten persons present.

Odonata.—Dr. Calvert said that in 1902 Mr. V. A. E. Daecke had seen, but not taken, near Lucaston, New Jersey, a dragon fly, which the speaker supposed from the description to be *Anax longipes.** On June 15th, 1914, a female *longipes* was taken at Clementon, N. J., by Mr. D. W. Steckbeck, Instructor in Botany at the University of Pennsylvania. The specimen was exhibited.

Arachnida.—Dr. Skinner exhibited specimens known in Texas as the "adobe bug." It is *Argas miniatus,* a tick, very injurious to poultry. Mr. Rehn said he had seen the species in great abundance in a chicken house in Texas. Mr. G. M. Greene exhibited a living whip-tail scorpion from Florida and remarked on the vertical position in which the filamentous tail was held whenever the animal was aroused.

Lepidoptera.—Dr. Skinner exhibited the variations of *Lycaena pseudargiolus* and commented on the multiplicity of names for the species. Mr. G. M. Greene exhibited *Alypia octomaculata* from Mt. Moriah, Delaware County, Pennsylvania.

Orthoptera.—Mr. Rehn said he had been studying African roaches and referred to the varying length of the tegmina in certain forms and concluded that the variations represented but a single species.—HENRY SKINNER, *Recorder.*

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* See Ent. News, xiv, p. 35, Feb., 1903.

American Entomological Society.

Meeting of April 22, 1915. In the absence of the President, Mr. Philip Laurent was called on to preside. Eight persons present.

Lepidoptera.—Mr. Daecke exhibited *Phalonia schwarziana* Busck, Wildcat Falls, Pennsylvania, VI, 6, 14, and *Salebria intermedialis* Walk., Riverview, Pennsylvania, VI, 23, 14. Mr. Williams exhibited the genitalia of *Anosia berenice* and *plexippus,* also the retractile tufts from the end of the abdomen; the tufts of *berenice* are much the larger. He also exhibited the "Butterfly Babies Book," which represents well known species of butterflies in an interesting way for children.

Odonata.—Mr. Daecke said he had observed a dragonfly, *Hagenius brevistylus,* carrying a female *Papilio turnus* and chewing it. —Henry Skinner, *Secretary.*

Los Angeles Entomological Club.

The Los Angeles Entomological Club will meet on the first Thursday evening of every month, during 1915, in the Music Room of the Los Angeles Public Library, 9th floor of the Metropolitan Building, Los Angeles, California. All entomologists are welcome.

Meeting of Jan. 7, 1915. Seven persons present.

Lepidoptera.—Mr. H. Newcomb exhibited some of his butterfly jewelry, which consists of *L. exilis* with part of a *Morpho* as background, mounted in gold and rock crystal. Mr. F. Grinnell, Jr., exhibited a collection of Lepidoptera, which he took in the high Sierras.

Meeting of February 4, 1915. Five persons present.

Hymenoptera.—Mr. Lonzo Smith spoke about his experiments with cross-breeding of the Italian and Black bees, with reference to increase in length of tongue.

Meeting of Mar. 4, 1915. Thirteen persons present.

Lepidoptera.—Mr. Haskin read a paper for publication in the "News" treating of *Lycaena piasus,* and *L. sagittigera.* Mr. Keil exhibited an interesting aberration of *Vanessa antiopa,* in which three wings were normal, while the left secondary had a very wide yellow marginal band and was without the blue markings. V. Duran exhibited a collection of butterflies from Argentina and pointed out the similarity of the Argentine Lepidopterous fauna to that of the Southern United States. Of the twenty-three species received, ten are found in this country; they are: *P. monuste, C. eubule, J. lavinia, P. carye, L. carinenta, C. lacinia* form *saundersii, C. ceneus, T. simaethis, P. phylaeus* and *C. ethlius.*

Meeting of April 1, 1915. Twelve persons present.

Mr. W. D. Duane gave a short talk on his recollections of Herman Strecker, Philip R. Uhler and Charles V. Riley, and some of his experiences collecting insects and orchids along the Amazon.

Lepidoptera.—Mr. V. Clemence exhibited a collection of *Neophasia menapia, N. terlooti* and *Anthocharis cethura* var. *morrisoni.* Mr. J. Graf spoke about the Tuber moth, of which he has found six parasites.

Hymenoptera.—Mr. E. Barrett said a few words about a chalcid fly, the larvae of which live in the seeds of alfalfa.

V. G. Duran, *Acting Secretary.*

Feldman Collecting Social.

Meeting of April 21, 1915, at the home of Wm. S. Huntington, 1910 N. 21st St., Philadelphia. Twelve members and two visitors were present. President Wenzel in the chair.

Dr. Skinner spoke of those who were collectors only but did not publish the results of their observations and work. He thought if there was more specializing and investigation in the line one was interested in and the results published, it would be best for all entomologists; it was all right to collect, but one should specialize. He cited several entomolgists who did good work in gathering a collection but published nothing. Mr. Wenzel said he had had no idea of the amount of time that would be involved when he started adding to his grandfather Feldman's collection, but the collection has grown to such a size that it taxes all his time to attend to the specimens alone.

Homoptera.—Mr. Daecke exhibited *Cicada noveboracensis* Em. from Morris, Pennsylvania, VI, 8, '11, and McAlisterville, Pa, VI, 10, '11, and *C. davisi* Grossb. from Anglesea, New Jersey, VII, 29, '11. The latter was collected by H. W. Wenzel, in the clutches of a *Paratenodera sinensis* Sauss.

Lepidoptera.—Mr. Daecke exhibited *Holcocera modestella* Clem. This species was known to breed from acorns. He has bred it from same and also chestnut, Inglenook, Pennsylvania, VII, 26, '14, and VIII, 16, '14.

Coleoptera.—Mr. H. A. Wenzel mentioned finding a chestnut tree at Beechwood, Delaware County, Pennsylvania, III, 21, '15, evidently felled only last year. Under the bark he found the workings of *Xyleborus inermis* Eichhoff, in which were dead and living imagos.

Diptera.—Also found under the same bark pupae of a Dipteron, which he had taken home and bred. These were exhibited and identified by Mr. Harbeck as an Ortalid, *Pseudotephritis corticalis* Loew.

Adjourned to the annex.—Geo. M. Greene, *Secretary.*

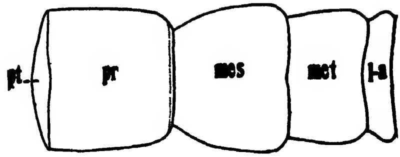

Fig. 1

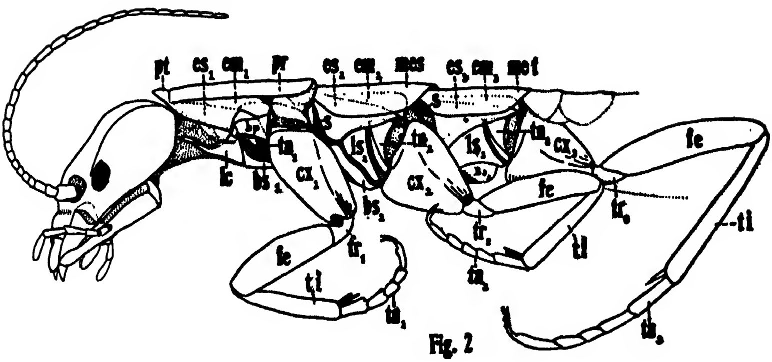

Fig. 2

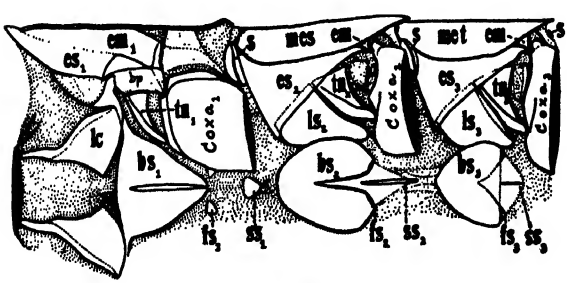

Fig. 3

GRYLLOBLATTA—CRAMPTON.

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CONTENTS:

The Thoracic Sclerites and the Systematic Position of Grylloblatta campodeiformis Walker, a Remarkable Annectent, "Orthopteroid" Insect.

By G. C. CRAMPTON, PH.D.*

(Plate XIII)

In the March, 1914, issue of the *Canadian Entomologist* (Volume xlvi, No. 3, pages 93-99), Dr. E. M. Walker has described and figured a very remarkable insect, *Grylloblatta campodeiformis*, which combines within itself characters common to a number of "Orthopteroid" insects. Indeed, in many respects, it may be considered as a veritable "living fossil," and from the point of view of the study of insect phylogeny, it is one of the most important of recent pterygotan forms. Through the kindness of Dr. Walker, I have been able to make a study of the external anatomy of this important an-

*Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

nectent insect, and would add the following details to the excellent general description he has already given of it.

In making a comparative morphological study of various insects in connection with the preparation of a paper dealing with the ancestry and affinities of the Hexapoda, it has become apparent that an attempt to trace the genealogy or relationships of insects largely through the study of their wing-venation is of little value. The study of no *one* structure or organ should be made the basis of such a work; and furthermore, the study of wing venation would be of no value in connection with larval forms, or with apterygote insects. In addition to this, some of the most important annectent forms (such as *Arixenia, Grylloblatta,* etc.) have lost their wings, and in such cases, a study of wing-venation would be quite useless. I have therefore laid greater emphasis upon the study of the head and terminal abdominal structures, and the thoracic sclerites (together with the parts of the legs), relegating the wing-venation to a position of secondary importance.

The accompanying figures of the thoracic sclerites of *Grylloblatta,* are of necessity somewhat "diagrammatic," since it was not always possible to clearly distinguish the outlines of the plates in a delicate insect which had been allowed to dry before it was placed in alcohol; and fear of injuring a valuable specimen prevented a thorough examination of parts concealed by overlapping structures. Subsequent examination of specimens preserved in alcohol, however, will, I think, demonstrate that the figures here given, are in the main correct. The terminology here employed, is that used in former papers dealing with the comparative anatomy of the thoracic sclerites (*e. g.* "Notes on the Thoracic Sclerites of Winged Insects:" *Entomological News,* Vol. xxv, Jan. 1914, pages 15-25).

The thorax of *Grylloblatta* presents a curious combination of characters also found in the Dermaptera, Isoptera (which are related to the Dermaptera as well as to the Blattids) and Gryllidae. As shown in Pl. XIII, Fig. 1, the outline of the pronotum (*pr*), mesonotum (*mes*) and metanotum (*met*) is quite like that of the nota of such wingless Dermaptera as

Anisolabis; the relative size of the nota is much the same as in *Anisolabis,* and the anterior sclerite *pt* (Fig. 1) is apparently also represented in the pronotum of the Dermaptera. The fact that the pronotum (*pr,* of Fig. 2) does not overlap the pleural region to any extent, while the mesonotum (*mes*) and metanotum (*met*) do overlap the pleural region, is strongly suggestive of the condition found in *Anisolabis;* and, indeed, the dorsal sclerites of *Grylloblatta* are more nearly like those of wingless Dermaptera than any other insects which I have examined.

The pleural region of the thorax presents some characters suggestive of the Dermaptera, and also of the Gryllids, but on the whole, the pleural region is more like that of the Isoptera than any other insects. The prothoracic episternum (*es,* Figs. 2 and 3) and epimeron (*em*) are much like those of the Dermaptera, but the presence of the clearly demarked sclerite *bp* is a feature which does not occur in any of the pterygote insects which I have studied, and is suggestive of the condition found in apterygote forms. The lateral cervicals (*lc,* of Figs. 2 and 3) are not divided into a number of smaller plates as in the Dermaptera, but rather resemble those of the Gryllidae, and even slightly resemble those of the Isoptera, except that they do not meet in the mid-ventral line as in the Isoptera and are not subdivided as in the latter insects.

The episterna and epimera (*es* and *em*) of the meso- and metathorax are quite like those of the Dermaptera, and are likewise somewhat similar to those of the Isoptera (which also resemble the Dermaptera). The "laterosternite" *ls* (Figs. 2 and 3) occurs in the mesothorax of the Dermaptera and Gryllidae, but in the metathorax of these insects it is indistinguishably united with the sternal region. Only in the Isoptera is the sclerite *ls* present as a distinct plate in both meso- and metathorax, as is also the case in *Grylloblatta.* The shape of the trochantin, *tn* (Figs. 2 and 3), and its division into an anterior and posterior region by an oblique suture, is characteristic of the Isoptera (and also of the Blattidae, to which the Isoptera are nearly related).

The fact that the sterna are widely separated, is characteristic of the Isoptera; and the triangular outline of the prosternum (bs^1, Fig. 3) is also strongly suggestive of the Isoptera. The smaller sternal sclerites *fs* and *ss* were very hard to distinguish, and I am not certain that their outlines are correctly portrayed, but as far as I could make out, they seem to resemble those of the Isoptera. The larger sternal plate, *bs*, of the meso- and metathorax is unlike that of any other insect I have examined.

The coxae (Fig. 2, *cx*) are extremely like those of the Isoptera, save for the fact that the meso- and metathoracic coxae of *Grylloblatta* are not divided by a vertical suture into two parts, as in the Isoptera, and in this respect they are more similar to the meso- and metathoracic coxae of the Blattidae. The trochanters are similar to those of the Isoptera and Blattidae. The femora on the other hand are strikingly similar to those of the Dermaptera. The tibiae also resemble those of the Dermaptera, somewhat, although certain features present in them are suggestive of the Isoptera and Blattidae. The four basal tarsal segments are as much like those of the Blattidae as any, but the terminal tarsal segment is surprisingly like that of the Dermaptera not only in shape but also in the absence of pulvilli, and in the character of the claws it bears.

It is therefore apparent from the study of the thoracic sclerites, that the Grylloblattidae combine in themselves characters which occur in the Dermaptera, Isoptera (and the closely related Blattidae) and Gryllidae. There are also certain features, which "presage" (so to speak) some of the characters which reach a fuller development in the crickets and katy-dids. It would be impossible, however, to form any definite conclusions concerning the affinities of the Grylloblattids from the study of the thoracic structures alone, and it is therefore necessary to take into consideration the head and terminal abdominal structures as well. (The ideal method would be to make a comparative study of the internal structures, the embryological development of the various organs, etc., in addition to the study of the external morphology, but in this case, such an

extended study is impossible, from lack of material). Before attempting to point out the relationship of the Grylloblattidae to the neighboring groups of insects, however, it will be necessary to briefly discuss the systematic position of these related groups, in order to more readily appreciate the meaning of the mutual resemblances of several of these groups, and to realize the significance of the combination of characters found in the annectent Grylloblattidae.

The two groups of pterygote insects which seem to have departed the least from the ancestral type, are the Plecoptera and the Blattidae. Certain Plecoptera nymphs are strikingly similar to the Lepismatidae, not only in their general "habitus," but also in various morphological details, such as the structure of the antennae, mouthparts, prothoracic sclerites, etc.; and in the same way, the Blattidae are strikingly similar to the Lepismatidae. Indeed, the resemblances between these immature Plecoptera (or the Blattidae) and the Lepismatidae are far greater than those between the Plecoptera (or Blattidae) and the higher pterygote insects such as the Diptera, Lepidoptera, etc. It would therefore appear to be very probable that the Plecoptera, Blattidae, and Lepismatidae (i. e. *Lepisma*, *Nicoletia*, etc.), are closely related, and doubtless sprang from very similar ancestors (i. e. from ancestors which would doubtless have been grouped into a single order, or possibly a single family).

Very closely related to the Plecoptera, on the one side, are the Embiidae; while on the other, the Plecopteron line of development is very closely paralleled by that of the Dermaptera. Indeed, such forms as *Arixenia* (specimens of which were kindly loaned me by Dr. K. Jordan), combine in themselves characters found in both Plecoptera and Dermaptera, and the immature stages of such Dermaptera as *Dyscritina*, *Karschiella*, *Bormansia*, etc., in which the forceps are preceded by Plecopteron-like cerci, serve to connect the Plecoptera and Dermaptera—or rather, they indicate a common origin for the two lines of descent.

The character of the antennal segments, the shape of the head, the nature and position of the eyes, the general shape of the mouthparts, many of the thoracic sclerites, certain of the leg structures, and many other features indicate that the Grylloblattids are very closely related to the Dermaptera. Furthermore, the fact that in the immature stages the previously mentioned Dermaptera have segmented cerci (which later become modified to form the forceps) clearly indicates that the Dermaptera are the descendants of forms having segmented cerci similar to those of the Plecoptera. The presence of segmented cerci (which are quite similar to those of immature *Karschiella*) in the Grylloblattidae, therefore, instead of militating against the view that the Grylloblattidae are closely related to the Dermaptera, would, on the contrary, indicate a community of descent between the two groups; and would simply show that the Grylloblattidae have departed less from the common ancestral type in this respect, than have the Dermaptera—and, indeed, the Grylloblattidae are more "primitive" in many other respects than the Dermaptera are. On the other hand, the presence of a well-developed ovipositor in the Grylloblattidae, might be regarded as a more highly specialized feature (although the fore-runners of ovipositors are to be found in *Lepisma, Machilis,* and other primitive insects). This however, does not affect the general primitive character of the Grylloblattidae, since it is a matter of common occurrence that animals which are very primitive in some respects, may develop certain other highly specialized features.

The Isoptera have apparently descended from ancestors having segmented cerci also, and, indeed, the cerci of *Archotermopsis* are composed of exactly as many segments as those of *Grylloblatta*—namely, eight. I had long suspected that the Isoptera were rather closely related to the Dermaptera (as well as to the Blattidae) and upon examining the various structures of *Grylloblatta,* it at once became apparent that we have in the latter insect a form annectent between the Dermaptera and the Isoptera (and leading to the crickets and katydids). I am convinced that *Grylloblatta* is descended from an-

cestors very like those of the Isoptera and Dermaptera (with the Plecoptera), and although *Grylloblatta* is much nearer to the Dermaptera than to the Isoptera, it furnishes a "connecting link" between the two. As will be later discussed, *Grylloblatta* also leads us to the common origin of the crickets and katydids.

The Coleoptera also combine certain features found in the Dermaptera and Isoptera, but doubtless are descended from ancestors nearer to the Dermaptera than to the Isoptera. The fact that some beetle larvae have forceps-like terminal abdominal appendages (e. g. *Cucujus, Pyrochroa,* etc.), while others, such as the Carabidae, have segmented cerci, was for a long time a very puzzling feature in attempting to determine the ancestry of the Coleoptera; but in the light of what has gone before (namely that the forceps of the Dermaptera are merely modifications of the segmented cerci of the ancestral forms) the occurrence of both forceps and segmented cerci in beetle larvae becomes immediately comprehensible, and takes its logical position in the general developmental scheme.

Very closely related to the Isoptera, are the Zoraptera recently described by Silvestri, 1913 ("Descrizione di un nuovo ordine di insetti," Portici, 1913). I have not been able to obtain any of these insects for examination, but it is quite evident that they are very closely related to the Isoptera, and also show certain Coleopterous affinities. Whether they are annectent between the Isoptera and any other group, can only be determined by a closer examination of the thoracic sclerites, etc., which are not clearly shown in Silvestri's figures; but I would not be at all surprised if they should prove to possess characters similar to the Grylloblattidae (and Dermaptera) also.

The Isoptera, as has been previously mentioned, are related to the Grylloblattidae and Dermaptera. They are also closely related to the Blattidae, perhaps more closely than to the Grylloblattidae, and thus occupy a position between the two. The Blattidae, on the other hand, are very closely related to the Mantidae. The complicated interrelations of these various

forms makes it impossible to arrange the orders in a dichotomously branching phylogenetic tree, since such an arrangement does not show the fact that several of the groups may overlap or approach one another from different directions, but merely allows for the branching in one plane.

As was previously mentioned, the Grylloblattidae occupy an intermediate position between the Dermaptera and Isoptera, and apparently branched off at an early stage from the ancestral Dermaptera-Plecopteron group. The tendency toward the development of an ovipositor (present in other primitive insects) has apparently found opportunity for expression in the Grylloblattidae, and in the crickets and katydids, which are descended from ancestors not unlike the Grylloblattidae. Indeed, the terminal abdominal structures of such crickets as *Oethancus* are strikingly similar to those of *Grylloblatta,* and the fore-runners of many structures which reach their greater development in the crickets and katydids are clearly evidenced in the Grylloblattidae. The crickets and katydids approach one another in such forms as *Gryllacris,* and have apparently descended from a common stock. This common stock, in turn, was derived from forms not unlike the Grylloblattidae—in other words, the Grylloblattidae have not greatly changed from the ancestral forms, although they, of course, have developed modifications of their own, as is true of all forms now living.

I have not seen such forms as *Phasmodes, Zaprochilus,* etc., but judging from the figures by Caudell, 1912 ("Orthoptera," family "Locustidae;" *Genera Insectorum,* fascicle 138), *Phasmodes* is an insect allied to the katydids, and related to both Phasmidae and Grylloblattidae. The Phasmidae, on the other hand are related to the Phylliidae (*Phyllium*-like insects), and the latter (Phylliidae) are in reality nothing but greatly flattened, walking grasshoppers!

The line of descent of the grasshoppers ("Acridiidae") is, I think, slightly different from that of the crickets (Gryllidae) and katydids ("Locustidae"), although it closely parallels the latter line. Judging from the antennae, mouthparts, thoracic sclerites, the nature of the "ovipositor," etc., the grasshoppers are in some respects more closely related to the Phylliidae than

to the "Locustidae" and Gryllidae. The fact that the "Acridiidae" Gryllidae and "Locustidae" are all saltatorial should have no great weight, for on this basis, we would have to group together the flea-beetles, Psyllidae, and any other forms which happened to have developed the power of leaping. The saltatorial habit is a purely physiological one, and should not have the weight of a fundamental structural resemblance. as will be elsewhere discussed.

There is apparent in many Phasmids, particularly the tropical forms from India, etc., a marked tendency toward the development of (or the retention of) an ovipositor, and forms such as *Phasmodes* and *Zaprochilus* seem to indicate a rather close relationship between the Gryllid-"Locustid" group (which is an ovipositor-bearing one) and the Phasmidae. On the other hand, forms such as *Timema* (specimens of which were kindly loaned me by Mr. Caudell) seem to point to a relationship between the Phasmidae and the Plecoptera-Dermapteron group, and hence with the Grylloblattidae. The relationship between the Phasmidae and Grylloblattidae, however, is more direct than through the mediation of the Plecoptera-Dermapteron group, and, in all probability, the Phasmidae and Grylloblattidae arose from very similar ancestors.

On the other hand, the Phasmidae and Mantidae are very closely related, and I must confess that the complicated interrelations of these lower groups is a very puzzling feature. Thus some Mantid-like forms such as *Mantoida* are very Neuropteron-like, and even resemble the aberrant Panorpid *Merope*. This, however, may be explained by the fact that the Neuroptera, Plecoptera (Dermaptera, etc.), Mantidae, Phasmidae, etc., all sprang from very similar (closely related) ancestors; and it is therefore to be expected that mutual resemblances would be retained by some members of each group.

The Psocidae are regarded by many recent investigators, as very near to the Isoptera and Plecoptera (with the Embiidae) —and therefore to the Grylloblattidae. I do not entirely agree with this view, however. The Neuroptera have departed but little from the ancestral group whence sprung the Trichoptera and Lepidoptera, the Mecoptera, Diptera and Siphonaptera,

and the Hemiptera-Homoptera, and it is with the *Neuroptera* and *Homoptera* that the Psocidae show the closest affinities. It is quite true that the ancestral Neuroptera very closely approach the ancestral Plecoptera, and in this way the Psocidae would be related to the Plecoptera and Isoptera, but the relationship is a rather indirect one, and, as has been stated, the affinities of the Psocidae are rather with the Homoptera and Neuroptera, than with the Plecoptera and Isoptera.

The complicated inter-relations of the various orders of insects makes it extremely difficult to arrange them in clearly defined groups. There are, however, at least two clearly defined "nuclei," or centers, about which the majority of pterygotan insects group themselves; further investigation will doubtless disclose other such centers. The two centers in question are the Neuroptera and the Plecoptera, and the ancestors of both of these groups were, in all probability, derived from forebears similar enough to be grouped into a single family.

The insects which group themselves about the "Neuropteron-center" constitute a supersection which may be referred to as the **Neuropteradelphia** (or "Neuropteron-brotherhood"), and all are the descendants of very similar ancestors—i. e., their ancestors would have been grouped into a single family. Here belong the following orders: Neuroptera, Trichoptera, Lepidoptera, Mecoptera (Panorpidae), Diptera, Siphonaptera, Homoptera, Heteroptera. Clinoptera (Psocidae), and others.

The insects which group themselves about the "Plecopteron-center" constitute a second supersection which may be referred to as the **Plecopteradelphia** (or "Plecopteron-brotherhood"), and all are the descendants of very similar ancestors. Here belong the following orders: Plecoptera, Platyptera (restricted to the Embiid-like insects), Dermaptera, Notoptera (Grylloblattid-like forms), Zoraptera, Isoptera, Cheleutoptera (Phasmid-like forms), Phylloptera (*Phyllium*-like forms), Diphtheroptera (grasshopper-like forms), Orthoptera ("Locustidae" and Gryllidae), and others.

The orders Palaeoptera (Blattid-like forms) and Dictyoptera (restricted to the Mantid-like forms) are very closely

allied, and may possibly be grouped into a third supersection, the **Palaeopteradelphia**. I am inclined, however, to include them in the Plecopteron group, since the Blattidae are closely related to the Isoptera, and also resemble certain Plecopteron nymphs.

Many pterygotan orders of doubtful origin (such as the Hymenoptera, Mallophaga, etc.) have been omitted from the foregoing discussion. It may be remarked, however, that the Hymenoptera very probably arose from ancestors not very unlike those of the Isoptera and Notoptera (Grylloblattidae), and would therefore be included in the Plecopteron group. This point, however, can be decided only after a more extended study of the Hymenoptera, and an examination of intermediate forms not at present accessible.

It will be noted in the foregoing discussion, that the Grylloblattidae are grouped into a distinct order, the **Notoptera** (a term signifying that the wings have been superseded by prolongations of the notum), and this, I think, is fully justifiable, if such groups as the Isoptera, Dermaptera, etc., are also to be considered as distinct orders. In no other group of insects do we find a combination of segmented cerci, ovipositor, broad coxae, five-segmented tarsi, divided trochantin, laterosternite (plate *ls*, of Figs. 2 and 3), distinctive sterna, etc., etc., which is characteristic of the "Notoptera," and clearly demarks the order from all others.

It will also be noted that the *Phyllium*-like insects have been grouped into a separate order, the **Phylloptera** (or "leaf-winged" insects). These are differentiated from other insects by the flattened condition of the body, together with the great reduction of the hind wings, the reduced and flattened antennae, the broad sternites, with peculiar pleural sclerites somewhat resembling those of the grasshoppers (yet are folded upward and "mesal-ward" in a distinctively characteristic fashion), the greatly reduced "cerci," flattened and greatly modified "ovipositor," etc.

The Phasmid-like forms and the Phylliidae are usually grouped by recent investigators, into a single order termed the

Phasmoidea. I quite agree with Shipley, 1904 ("The Orders of Insects," Zool. Anz., Vol. 27, pp. 259-262), however, in his contention that the terms applied to the orders of pterygote insects should always end in "-ptera," for the sake of uniformity. Since the term Phasmoidea does not end in "ptera," I would substitute for it the designation **Cheleutoptera** (referring to the folding of the hind wings in longitudinal plaits, when at rest), and would also remove the Phylliidae from the "Phasmoidea," and place them in a separate order, the Phylloptera.

The grasshoppers differ from the remainder of the "Saltatoria" in that the ovipositor is short, the cerci are greatly reduced, the sterna of the meso- and metathorax instead of being separate, are closely united and interlock (or are "dove-tailed") in a peculiar fashion, there is no plate (the laterosternite) between the mesothoracic sternum and pleural region as in the other forms, a single pulvillus (absent in the other forms) occurs between the tarsal claws, the labium and other mouthparts are different from those of the other forms, as is true of the antennae (which are short, and have segments of a different character), etc., etc. I have therefore placed the grasshoppers in a different order, which I would call the **Diphtheroptera** (or "leather-wings," referring to the nature of the tegmina).

The crickets and katydids form the greater part of the order "Orthoptera" (in the restricted sense), and compose its two principal suborders. The crickets form a distinct suborder, the **Gonioptera** (so-called from the fact that the lateral portion of the tegmina is bent downward and forms an angle with the upper portion of the tegmina); and the katydids form another well-defined group, which may be called the **Phytoptera** (from the resemblance of the wings to parts of the plants). The Gryllotalpidae possibly form another suborder, the **Paraphytoptera,** intermediate between the other two; but this point needs further investigation. The *Phasmodes*-like forms are sufficiently different from the other katydids to form a distinct suborder—if not a distinct order; which may be designated as the **Protophytoptera.**

The Blattidae and Mantidae are classed as distinct orders by certain recent investigators (Handlirsch, etc.) and very rightly so, but the terms Blattoidea and Mantoidea, applied to these orders, do not end in "-ptera," as they should do, for the sake of uniformity. I would therefore substitute for "Blattoidea," the designation **Palaeoptera** (referring to the ancient character of the wings), and for Mantoidea, I would substitute the older designation Dictyoptera (used in the restricted sense).

The Hemimeridae are regarded by some investigators as related to the Blattidae, but Verhoeff has correctly classed them with the Dermaptera, and regards them as a suborder, to which he applies the designation Dermodermaptera. The Arixenidae are also to be regarded as aberrant Dermaptera, and form a suborder which may be called the **Plecodermaptera,** from their resemblance to the Plecoptera.

Summary.

The principal points brought out in the foregoing discussion may be briefly summarized as follows:

(1) The thoracic structures of the Grylloblattidae present a combination of characters found in the Dermaptera, Isoptera and Gryllidae.

(2) The Grylloblattidae constitute a distinct order, the Notoptera.

(3) The Notoptera occupy a position intermediate between the Dermaptera and Isoptera, and are the nearest living representatives of the common ancestors of the Gryllidae and "Locustidae" (Tettigonidae).

(4) The Platyptera (Embiidae), Plecoptera, Notoptera and Dermaptera are very closely related, and sprang from ancestors so similar that they would have been grouped in a single family, or subfamily.

(5) There are at least two (possibly more) centers about which pterygote insects group themselves, namely, the Plecoptera and the Neuroptera. The ancestors of both probably sprang from a common stock.

(6) The Plecoptera (certain immature forms) and Palaeoptera (Blattidae) are strikingly similar to the Lepismatidae, and the ancestors of all three must have been very closely related.

EXPLANATION OF PLATE XIII.

Fig. 1. Terga of pro-, meso- and metathorax and first abdominal segment, seen from above.

Fig. 2. Lateral view of anterior portion of the insect. Only the basal portion of the abdomen is shown (as dotted lines). The position of the episternum and epimeron (of meso- and metathorax) indicated by dotted lines, to indicate that they lie below the overlapping terga.

Fig. 3. Ventral view, showing sternal plates and one side of the body. All are represented as though stretched out in one plane.

All figures are of *Grylloblatta campodeiformis* E. M. Walker. The figures are somewhat diagrammatic.

Abbreviations.

1-a—First abdominal tergite.	*mes*—Mesonotum.
bp—Basal pleural sclerite.	*met*—Metanotum.
bs—Basisternite (largest sternite).	*pr*—Pronotum.
cx—Coxa.	*pt*—Pretergite.
em—Epimeron.	*s*—Spiracle.
es—Episternum.	*ss*—Spinasternite.
fe—Femur.	*ta*—Tarsus.
fs—Furcasternite (in two parts in prothorax).	*ti*—Tibia.
	tn—Trochantin.
lc—Lateral cervical sclerites.	*tr*—Trochanter.
ls—Laterosternite.	

The subscripts 1, 2 and 3 indicate that the structure in question belongs to the pro-, meso- or metathorax.

Two New Names in the Ascalaphidae (Neur.)

The genus *Ptynx* Lefev. was proposed with *costatus* Burm. as only species; this species was already the type of *Haploglenius*, so that *Ptynx* Lefev. is a synonym of *Haploglenius*. *Neuroptynx* McClend. was proposed to replace *Ptynx* (*preoc.*), and so also falls as synonvm of *Haploglenius*. Therefore, I propose **Ascaloptynx** n. n. with the generic characters assigned by Weele for *Neuroptynx*, with *Ascalaphus appendiculatus* Latr. as its type.

The genus *Orphne* Lefev. (Agassiz gives *Orphnus* also *preoc.*) was proposed for *Ascalaphus appendiculatus*, but is preoccupied by Hübner. *Orphne* as used by MacLachlan and Van der Weele is thus without a name, and MacLachlan was aware that he was using the name in a wrong sense. Therefore, I propose **Ascalorphne** n. n. with the generic characters usually assigned to *Orphne*, and with *Ascalaphus macrocercus* Burm. as its type.—NATHAN BANKS, East Falls Church, Virginia.

The Urgent Need of the Economic Entomologist.

By A. A. Girault, Washington, D. C.

My experience as an economic entomologist has taught me that when a man of science is in a position where he is expected to be practical in the ordinary meaning of that word, either he or the public has to surrender. The so-called practical man is too often just the opposite as I am reminded by a conversation which I once had with a farmer. This man was thought to be very practical; he had a large farm which was *profitable*. He was a man of affairs and family. As a practical man, he became interested in a certain insect which was causing him considerable loss from year to year. He made it an object of his business and for many years experimented with various operations and objects and so obtained a large experience in dealing with the insect. I visited him especially for this reason as I hoped to obtain the results from all these years of experiment and experience. I was greatly surprised, however, to find that there had been *none*. In the course of the conversation this eminently practical man intimated to me that, though he was a practical man, he was not a writer, meaning to show, I suppose, his contempt for such an impractical operation. He gave me various accounts of his experiments but it needed no acumen to see that they had long since been lost to him and that he was totally confused. This eminently practical man could not perceive his own impracticality in not making use of the art of writing.

We see then that the word *practical* has a somewhat false meaning in popular use. To expect a scientist to be thus practical is like expecting him to renounce himself together with all of those aids which the really practical sense of man has laid up in store for his *proper* use. I have in mind theories, books and mechanical appliances. All are greatly abused and most are worthless. A small minority are invaluable and true. Practicality in life is shown by the use of those aids made by the individual, his selection of the worthy and rejection of the false.

It is so with the economic entomologist. Primarily he should know biology; he should be conversant with the accepted theories or truths, the broad general descriptions or laws of life; he must be practical in the use of literature, meaning by that discriminating; he should have had actual experience with many kinds of plants and animals, for upon his experience combined with his capacity will depend his entire practicality, his whole education, his character. He must, of course, have had a large experience in dealing with insects and their control. In a word, he should be truly educated, which means self-developed, learning from experience, accepting all of the aids within his reach toward that end but with discrimination.

Economic entomology should be considered as being within the broad field of applied biology, including medicine and agriculture in their widest sense. But, fundamentally, it is pure biology, and therefore pure science and the efforts of the layman for profit to make of the economic entomologist a creature belonging to him and a practical man in the ordinary sense cannot result in anything else than loss to both, for the economic entomologist must be fundamentally a biologist studying insects and a biologist cannot be prostituted for gain without hurt to himself. As a necessity, he cannot safely for gain or for any other object whatsoever, prostitute his own mentality in order to satisfy *current* or *local views* regarding what is practical. Thus we come to one of the crying needs of the economic entomologist—that he should become no less than theoretical.

In applied entomology it is almost trite to state that a *true* knowledge of the habits, instincts and home relations of insects is the basis for all operations against them. Yet, how few insects have been carefully and thoroughly studied. The absence of knowledge concerning some particular habit often results in failure to cope with the insect, while the absence of theories concerning the home relations of insects often leads to faulty recommendations which may cause loss in one way or another. If economic entomology was on a broad biological

basis, that is, theoretical, there would be less uncertainty concerning the application of parasitology and more certainty regarding the importance of local conditions in causing variation in the life histories of insects. Nothing that is true is impractical; its practicality may not be seen at the time, but in the end all knowledge becomes of use, directly or indirectly. Of all knowledge, the theoretical is the most practical and I have no doubt that as soon as the economic entomologist becomes theoretical, immediate practical results will be forthcoming and new fields of prophylaxis and treatment opened.

Preliminary Notes on Iowa Pentatomoidea (Heterop.).

By Dayton Stoner, State University of Iowa, Iowa City, Ia.

During the summer of 1914 advantage was taken by the writer of visiting various parts of the State of Iowa for the purpose of collecting insects and in the course of these trips a few species of Pentatomoidea heretofore unrecorded from the State were secured. Some new host plants for species that have been recorded also were noted and some further records of local abundance and distribution were obtained.

As only a very little has been recorded on this group for Iowa since Herbert Osborn's work of more than a decade ago, it was thought that notes on some of the species might be of interest at this time. The following data are in no way complete and represent only a brief preliminary account of a more extensive study which is now being undertaken on this group and which, it is hoped, will be completed in the near future.

Thus far in the work, collecting has been done in northeastern Iowa, commonly designated as the "driftless area" of the State, and also in the north central and south central counties. No collecting has been done in southeastern Iowa and only a very little west of Des Moines. Both the southeastern and the western parts of the State should yield some interesting forms and a more complete knowledge of the status of the Pentatomids in Iowa should be available after another season's collecting.

So far as the writer is able to determine, 51 species of Pentatomoidea had been recorded from Iowa up to 1898 by Osborn, and since that time but one additional record has been published. Of these 52 species the material now at hand represents 38 species and an additional 5 species which have not before been recorded. Not all the recorded species are mentioned in the following list, those only being included which may be of particular interest. The new records are also indicated in these notes.

Family CYDNIDAE

Subfamily Thyreocorinae

Thyreocoris pulicaria Germar. This is the most common species of the family and has been taken in practically every locality visited. At Ames it has been taken in June in great numbers from potato and some damage to the plants may be attributed to it.

Thyreocoris unicolor Beauv. This species has not before been recorded from Iowa, but of the members of the genus it is surpassed in abundance only by *T. pulicaria.*

Subfamily Cydninae

Sehirus cinctus Beauv. This species, heretofore unrecorded from Iowa, has been found in but two localities and apparently is nowhere common. A single specimen was taken in July at Grinnell on wild raspberry. At Iowa City the species has been taken in March from under boards and sticks in a field that had been used as a pasture during the previous season.

Family PENTATOMIDAE

Subfamily Pentatominae

Coenus delius Say. Widely distributed but nowhere common. Taken in timothy and clover fields. Also found hibernating under sticks and dry weeds in late March and early April.

Euschistus tristigmus Say. Only fairly common; found usually on hazel. A single hibernating form also has been found.

Euschistus variolarius Beauv. Next to *Peribalus limbolarius* this seems to be the most common species of Pentatomid met with in the State. A number of hibernating specimens have been found.

Hymenarcys aequalis Say. Of this species Osborn says, "Not common." Fifty specimens are in our collection from the following localities: Iowa City, Bayfield, Monticello, Hampton, Indianola and Corydon. We have found the species in practically every month of the year and it is a common hibernating form.

Hymenarcys nervosa Say. Less common than *H. aequalis.* Commonly found hibernating under boards and weeds in pastures.

Murgantia histrionica Hahn. This species was first recorded from the State by the writer in 1912 (Ent. News, xxiv, 132, 1912), but since that time, although careful search has been made in a number of localities, other specimens have not come to light.

Neottiglossa sulcifrons Stal. Not before recorded from Iowa. One specimen from Chariton in the south central part of the State.

Neottiglossa undata Say. Of this species Osborn says, "Not common." The writer has many specimens from several localities, thus indicating that it is at least fairly common. The following field note will give some idea of its abundance at Ames: "7th July, 1913; this species (*N. undata*) very common along roadsides just south of the West Side at Ames, Iowa. Collected 30 specimens and as many more could easily have been secured * * *." The species has also been taken on mullein.

Chlorochroa persimilis Horv. Not before recorded from Iowa. Apparently it is not abundant and is common only locally.

Peribalus limbolarius Stal. This is the most common species of Pentatomid found in the State.

Solubea pugnax Fabr. This species has been taken only once, September, Iowa City.

Thyanta custator Fabr. We have found this pretty green species in practically everyone of the thirty-four counties visited in the State during the past summer. It seems most abundant in rank growths of timothy and red clover. A number of specimens are of a yellowish green or reddish brown color and in no case do these specimens have the sanguineous band on the pronotum. On many of the typically colored green specimens this band is also lacking.

Brochymena annulata Fabr. Not common; specimens at hand from Iowa City only.

Brochymena arborea Say. More common than the preceding species; collected on wild crab apple.

Brochymena quadripustulata Fabr. The most common species of the genus, but it has not before been recorded from Iowa. On one occasion it has been found hibernating under oak leaves at the edge of a woods in early April.

Subfamily Graphosomatinae

Podops cinctipes Say. Not common and found in but three localities, Iowa City, Davenport and Chariton, and all south of the center of the State.

Subfamily Asopinae

Apeteticus cynicus Say. Taken on wild cherry; east central Iowa.

Apeteticus maculiventris Say. A fairly common species in almost every locality.

A new Species of Campoplex (Hym., Ichneumonidae).

By Henry J. Franklin, Superintendent of the Cranberry Station of the Massachusetts Agricultural Experiment Station, East Wareham, Mass.

Campoplex variabilis n. sp.

♀—Length 8 mm.; greatest diameter of lateral ocelli of approximately the same length as the shortest distance between those ocelli and the nearest eye-margin.

Head and thorax black and thinly clothed with silvery pubescence. Abdomen with first segment black; second dorsal segment dark brown, but shading into ferruginous toward the apical margin; second ventral segment entirely stramineous; third and fourth segments entirely ferruginous; fifth segment with basal portion ferruginous and apical part black, the line of demarcation between the two colors being very irregular and rather indefinite; the remaining segments entirely black.

Antennae dark brown. Mandibles dark, but slightly tinged with reddish brown. Palpi dark brown. Tegulae dark brown. All the coxae and trochanters black; front femora mostly yellowish-ferruginous, but somewhat darkened toward their bases; middle femora dark brown for the most part, but light ferruginous or stramineous apically; fore tibiae and tarsi stramineous; middle tibiae stramineous, but somewhat darkened toward their bases; middle tarsi dark; hind legs entirely dark. Wings hyaline and slightly darkened.

Type.—The specimen from which the above description was made came from Wareham, Massachusetts, and is deposited in the collection of the Massachusetts Agricultural College. This specimen and six others of the same species were bred by the writer from the larvae of *Epelis truncataria* var. *faxonii* Minot, from 25 to 30 per cent. of the *Epelis* larvae being infested with this parasite. They emerged from their host larvae and formed their cocoons between July 23 and August 8, 1913. The cocoons were elliptical in shape and coffee-brown in color and ranged from 6.5 mm. to 7.5 mm. in length. The adult parasites emerged on dates ranging from June 12 to June 27, 1914. These specimens showed much variation in coloration, and three color variants based on this variation are here described:

Color Variant 1.—Like the typical form, but with entire apical half of second dorsal abdominal segment ferruginous, basal two-thirds of fore femora darkened, middle femora entirely dark, basal halves of middle tibiae dark, and apical segments of fore tarsi brown.

One specimen, deposited in the collection of the Massachusetts Agricultural College.

Color Variant 2.—Like the typical form described above, but with mandibles for the most part stramineous, palpi dark stramineous, tegulae stramineous, apices of fore coxae touched with stramineous, fore trochanters and femora entirely stramineous, middle tarsi mostly stramineous, but their apical segments brown.

One specimen, deposited in the collection of the Massachusetts Agricultural College.

Color Variant 3.—Like Color Variant 2, but with distal half of middle femora stramineous, middle tibiae entirely stramineous, and hind tibiae considerably stramineous along their front sides except at base and apex.

Two specimens, one of which is deposited in the collection of the Massachusetts Agricultural College.

This very variable species may grade into forms heretofore described, but, as its relationships are unknown and as it seems necessary to establish its identity in connection with the writer's cranberry insect investigations, it is here described as new. Moreover, the detailed description of so great variation as is shown by these specimens is always desirable.

Boisduval's Lycaena piasus and Lycaena rhaea (Lep.).

By J. R. Haskin, Los Angeles, Cal.

Two very interesting series of notes have recently been published concerning M. Charles Oberthür's figures of the Boisduval types of North American Lycaenidae. One of them is entitled "Lycaenidae of California Described by Boisduval," by William Phillips Comstock, in the *Journal of the New York Entomological Society*, Vol. xxii, No. 1, March, 1914, and the other is entitled "Notes on the Synonymy of Boisduval's N. American Species of Lycaenidae," by J. McDunnough, Ph.D., in the *Entomologist's Record and Journal of Variation*, Vol. xxvi, No. 9, September 15, 1914, in London, Eng. Messrs. Comstock and McDunnough, after an examination of Oberthür's figures, have both come to the conclusion that American entomologists, during the past fifty years, have

wrongly identified *L. piasus*. According to the Oberthür figure *L. piasus* is identical with Felder's *L. sagittigera.*

I have made a very careful study of Boisduval's descriptions in his *Lepidoptères de la Californie* and know from personal observation a little of the habits of *L. piasus* and *L. sagittigera.* The Oberthür figure would seem to show a startling misidentification, but I find it very difficult to reconcile myself to accept this alone as proof that *piasus* is the insect which Felder named *sagittigera* and which Boisduval later described and named *rhaea.*

Let us consider Boisduval's descriptions in the *Lepidoptères de la California,* 1869. In this edition he first gives the descriptions of the insects described in his paper of 1852, covering the material collected by M. Lorquin in Central California and particularly in the San Francisco Bay district in the years 1849 to 1852. He then describes additional material collected later by M. Lorquin during a series of trips which covered not only his first collecting grounds but also a part of what is now the southern part of the State of California.

Among the re-descriptions of the 1852 material we find:

38. *Lycaena piasus,* Boisd.

(Free translation from the Latin.)

Wings above dark blue-violet, pearl-white fringes, female with black margins; below ashy-white, with numerous ocellated black spots, separated by a white band.

(Free translation from the French.)

Slightly larger than our Argiolus, which it much resembles at first glance. Flitting in the spring and in summer in the woods.

39. *Lycaena pseudargiolus,* Boisd. and Leconte, Iconog. des Lep. de l'Amerique septentrionale, PC. 36.

(Free translation from the French.)

Does not differ from specimens from other parts of the United States. Flitting in numbers in April in the hedges.

In the second part of this paper, which covers the descriptions of the later material outlined above, we find:

33. *Lycaena rhaea,* Boisd.

(Free translation from the Latin.)

Wings above sea blue-violet with black margin and white fringe

intersected with black; below dark, ashy; forewings with black ocellated spots; secondaries with a broad, transverse, toothed, white band and with black, ocellated spots in the basal area? (*basilaribus.*)

(Free translation from the French.)

This beautiful species does not resemble any of our European species. It is a little larger than our *battus*. Above the wings are violet-blue with a rather wide dusky border and white fringe broken with black. Below it is dark cinder-colored; the forewings are marked with one basal spot, with a central lunule and with a sinuous line of well ocellated black spots; outside of the sinuous line one can see a sort of whitened band followed by little black crescents. On the secondaries the base is even more obscure and offers towards the base some black, ocellated spots, upon the cellule a whitened blot, next in order a row of black spots followed by a very clear white transverse band, toothed like a saw.

The female differs from the male in that one can perceive on the upper side of the secondaries the trace of two or three obsolete tawny lunules.

This charming *Lycaena* was taken by M. Lorquin in the far South in the vicinity of Los Angeles.

From the above descriptions I draw the following conclusions:

The under side of *L. rhaea* (or more properly speaking *L. sagittigera*, Felder, syn. *L. rhaea*, Boisd., since Felder described it before Boisduval's second paper was published) is strikingly different from any other species. Boisduval notices this at once in his description. If Lorquin had sent him any of these specimens prior to 1852 he would have described them fully in his first paper just as he did in his second paper. *Sagittigera* reaches its perfection in Southern California where Lorquin collected it subsequent to 1852.

Concerning *L. piasus* this is not strikingly different from certain other species and Boisduval did not exert himself to give a careful detailed description. We note its juxtaposition to *L. pseudargiolus* in the list of descriptions, and we know that it is somewhat different. It is one of our commonest spring butterflies and Lorquin could not have failed to send a large series of them prior to 1852. If Boisduval intended his description of *piasus* to cover *sagittigera*, where

then is his description of the species which we call *piasus?* The western form of *ladon,* Cramer (*pseudargiolus,* B. and LeC.) has strong enough characteristics to warrant the assumption that Boisduval would describe it.

In the description of *L. piasus* Boisduval states that it has white fringes. The fringe of *sagittigera* is very heavily cut with black, especially on the primaries, so much so in fact that the fringe might be described as white with black spots at the ends of the veins. None of the other California species of this genus except *sonorensis* approaches *sagittigera* in this characteristic.

Finally, Boisduval gives a brief tell-tale note of *piasus'* habits. He states that it flits about in spring and summer in the woods. This is peculiar characteristic of *L. ladon* including its western form *L. piasus.* They frequent the thickets and light woods and are not commonly seen out in the open spaces as are nearly all the other Lycaenae. I have a long series of perfect *sagittigera* and have never seen them in a similar locality. They were all taken in the open country flying low about the flowers, weeds and short brush.

If Oberthür's illustration, labelled *piasus,* really represents a true *sagittigera,* is it not probable that the labels have been mixed? I presume there will be considerable discussion of this matter before a definite conclusion is made. I have a number of spare specimens of *L. sagittigera* from the vicinity of Los Angeles and will be very glad to send samples to anyone desiring them for comparative study.

Boisduval's Lycaena piasus and Lycaena rhaea (Lep.).

By Henry Skinner.

Mr. Haskin has raised a question that may be solved according to the weight of evidence. His contention is based on the probability of the labels being mixed. The figure 1950 given by Mr. Oberthür as *piasus,* represents what we always called *sagittigera* Felder. It is a very variable species and specimens without the checkered fringes are sometimes found. We have one specimen in the collection of the Academy that

agrees perfectly with the figure of *piasus*. *Rhaea* is the more ordinary form. The description of *piasus* Boisd., applies best to the species known later as *sagittigera* Feld. "Fringe whitish" applies to the specimen figured as the type by Oberthür, "with numerous black ocellated spots." This applies perfectly to *sagittigera* but not to the western form of *pseudargiolus* (*argiolus* Linn.) "separated by a whitish band." This also applies to *sagittigera* and not at all to *pseudargiolus*. The ocellated spots and the whitish band appear to me to be conclusive and can't possibly apply to *pseudargiolus*. "A little larger than our *argiolus*, which it strongly resembles at the first glance." This also applies to *sagittigera*, as the western *argiolus* is about the size of or smaller than the European species.

The final argument is the fact that Dr. Boisduval knew and fully recognized *Lycaena pseudargiolus*, as he says "This does not differ from specimens from other parts of the U. S. It flies commonly in thickets in April." It is likely that the species described by Boisduval and sent to him by Lorquin was only represented by meagre material and when he subsequently received "*rhaea*" he redescribed the same species. The descriptions of *piasus* and *rhaea* are very similar. Boisduval says the latter came from "around Los Angeles."

The weight of evidence seems to be on the side of the *piasus* description agreeing with the Oberthür figure. Mr. Oberthür will probably be able to shed additional light on the subject. The description of *piasus* can't possibly apply to the western *argiolus*.

The Entomological Society of Ontario.

The Fifty-second Annual Meeting of the Society will be held in Ottawa on November 4th and 5th, 1915. Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture, has kindly consented to give the annual public lecture on Thursday, November 4th.

A Liquid Preservative for Insects.

P. Schulze recommends for the preservation of galls, of coccids on plants and of larvae for dissection, especially in the tropics, the following mixture: 200 cc. glycerine, 200 cc. distilled water, 1 gram crystallized carbolic acid. (*Deut. ent. Zeitschr.*, 1915, p. 204.)

A Few Notes on Queensland Insects.

By A. A. Girault.

1. Hounds Devouring Grasshoppers (Orth.).

One day (June 28, 1912) on a sugar plantation near Cairns, N. Q., I saw one of a pack of four or five kangaroo dogs, a breed resembling the greyhound, on several occasions give eager chase to adults of *Locusta australis*, a large grasshopper; those which it succeeded in capturing were devoured with apparent relish.

2. Nyctalemon orontes (Lep.).

This day-flying moth is commonly seen flying singly like a butterfly; in November, 1912, at Nelson, North Queensland, the species was gathered in enormous numbers in dark and moist situations in the forest, covering the trees bordering streams in myriads and flying up in clouds as we advanced. Many were mating. The species, otherwise, is seen flying along singly throughout the year.

3. Activity of Orthoptera.

In North Queensland, throughout the year, the constant chirping of various kinds of crickets and long-horned grasshoppers is one of the daily sounds, though so monotonous that, like the ticking of a clock or watch, attention has to be directed to it before notice is taken. The constancy, however, is remarkable. I do not remember a time in the year when I have not been able to detect the chorus of sounds proceeding from that source.

4. Canaries Protected from Mosquitoes (Dip.).

I have been told that canaries kept as pets have to be covered with a net to protect them from mosquitoes and other biting flies; otherwise, they would go blind and lame from the constant bites of these insects. On one occasion I have happened upon an instance of this kind (at Seymour, Ingham District, North Queensland).

5. Pheidole megacephalus Fabricius Dying from Cold in North Queensland (Hym.).

Toward the last week of July, 1912, all over the Goondi, Darradgee and Mundoo cane plantations near Innisfail, I saw little heaps of dead ants, each heap containing several hundred specimens of the workers and soldiers. They were rather common and I was considerably puzzled to account for them until chancing to hear from a farmer that young sugar cane had been slightly damaged by recent frosts; the ants doubtless had suffered from the same cause, the more clearly indicated because the species appears to be an equatorial one or one of the uplands or of situations not exposed to cold spells in the tropical sense. Nests adjoining the heaps of dead contained living individuals acting as usual. Later, on August 8, at Nelson, North Queensland, I found the same species, dead in similar heaps; if along a road, these heaps all seemed to be in the wheel ruts; from their appearance, they were several weeks or more old. The name of the species was kindly given to me by Mr. Henry Tryon who, I think, had sent specimens for identification.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., OCTOBER, 1915.

On Buying and Selling Insects.

There has lately been injected into the study of entomology a wave of commercialism that has done harm in a number of ways. The idea has been spread broadcast through the country that it is an easy matter to collect insects and sell them, particularly butterflies and moths. The statement is made that there are millionaire collectors who are just thirsting for material and that many institutions buy specimens of insects. The net result of this is keen disappointment to many persons and annoyance and bother to others. The aspirant for wealth by the sale of insects collects some *Pieris rapae, Colias philodice, Vanessa antiopa* and raises a few cecropias from the cocoon and then writes to some entomologist or institution asking how and where he can find a market for such things. Generally the aspirant for wealth wishes a list of those who buy, and those who buy have been collecting all their lives and of course will buy desiderata but can't be charmed by a luna moth or a cabbage butterfly. It is quite true that a good collector in a favored locality, can sell material properly caught, but it is equally true that one can't sell insects to good collectors when the insects are the same species that the collector can readily get himself. There are certain phases of the business advocated and advertised that are not only misleading but absolutely dishonest. Many persons are wasting their money for collecting apparatus, literature, postage, etc., who will never be able to derive a cent of profit.

The writer can't tell people where to sell common insects, and wishes some way of avoiding many letters from persons asking for information in regard to selling their wares. Personal visits and 'phone calls are also an annoyance. The NEWS will esteem it a favor if subscribers, willing to buy specimens, will send in their names and addresses so that commercial beginners may have an avenue by which they can acquire money and even wealth.—H. S.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Habits of Xenoglossa brevicornis (Cresson) (Hym.).

The Rev. G. Birkmann, of Fedor, Texas, writes as follows: "I am sending you some bees which were gathered for a night's rest on the sprig of mesquite, also sent. Altogether there were just a dozen, all males. It is the first time I have found them so. They took hold of the leaves' petiole with their jaws, swung clear, and brushed themselves with their feet, then quieted down. All twelve were on the small twig during the whole night. I had taken them to my room. At 7 o'clock in the morning they were still resting, clinging to their twig on my desk, beside an open window. Date of capture, July 5." The specimens sent are all males of *Xenoglossa brevicornis.*—T. D. A. Cockerell, Boulder, Colo.

An Observation on a Buprestid (Col.).

On the 17th of May, 1915, I received word from Mrs. H. Grandjean, of Oakland, California, that she had found a "beautiful green beetle," which had been working inside the door stile of the toilette-room, and that she had saved it for me. On the following Sunday I went to her house and was shown the door, which I examined carefully. It appears that the lady saw something moving on the door stile, which on closer observation proved to be a beetle trying to escape from inside the stile. She took a penknife and enlarged the hole sufficiently to allow the insect to escape. The beetle was a *Buprestis aurulenta* Fab. During the careful examination of the door I failed to find any evidence of any other holes, other than the one of exit, which was one and one-half inches deep and very nearly perpendicular. Otherwise the door was in perfect condition. From the bottom of the hole some wood dust was removed; it was of the color of healthy, dry, white pine, of which the stile was made.

In looking up the history of the house I found that the present owner, Mr. H. Grandjean, had purchased the house some twenty-one years ago, and it was at that time five years old, which made the total time twenty-six years since the house was built. The door in which the beetle was found had never been changed or replaced, and had been painted and varnished twice during the twenty-one years. The most interesting question about this beetle being in the door is, how long had it been since the egg, or the larva, gained entrance to the wood of that stile?

Buprestis aurulenta Fab. is one of the most common species of the genus in California, and is naturally confined on the Pacific Coast to the districts timbered with coniferous trees. Dr. Blaisdell tells me that it is plentiful in Oregon and Washington; in California he has col-

lected it in Siskiyou, Calaveras, Placer, Alpine, Marin and Sonoma Counties, at the higher altitudes and wherever coniferous trees were found. Its occurrence at lower levels, and in cities and towns, can be accounted for by its transportation in the timber that is taken there and which contains one or the other of the early stages of the insect. I have collected it in Placer and Eldorado Counties. Mr. L. Munier has also taken it in Plumas County. The occurrence of the above reported specimen under such conditions is something very unusual and offers an opportunity for speculation as to how and when the egg, or larva, gained access to that door. Was it previous to the building of the house, or did a stray beetle enter the house and oviposit in that door at a recent date?—J. C. Huguenin, San Francisco, Cal.

Notes on Some Chalcidoid Hymenoptera from Java.

The following notes are upon some parasites sent to me by Herr P. von der Goot, Pasoeroean, Java.

1. *Paranagrus optabilis* Perkins. A number of specimens of both sexes, which agree with specimens of *P. perforator* Perkins from North Queensland, except that the ovipositor is not exserted; they also agree with the original description of *optabilis* except that the abdomen is dusky above before tip in some female specimens; in other females, the abdomen was not marked with dusky. The antennal joints varied somewhat. One male specimen had the abdomen wholly dusky. The specimens were reared April 4, 1913, from the eggs of *Dicranotropis* (*Perkinsiella*) *vastatrix* Breddi and both this host and the locality are new for the species. The host was on sugar cane and the wide distribution of the parasite is thus accounted for.

2. *Arrhenophagus chionaspidis* Aurivillius. It was surprising to meet with this curious encyrtid from Java, though it is known to occur in Asia. A large number of specimens were reared from *Aulacaspis rosae* on rose, March 25, 1913. I have verified its redescription published by me in 1911, yet the antennae still need very careful scrutiny from fresh specimens.

3. *Ablerus pulchriceps* Zehntner. So far as I know, this is a valid species differing from six North Queensland species by bearing a distinct wing pattern. Thus, in addition to the two bands across the forewings (common only to extra-Australian forms), the second band sends off an arm to the wing apex just below (caudad of) the middle of the wing blade. I will point out elsewhere that *Azotus* Howard and *Ablerus* of the same author are identical. In *pulchriceps* also the proximal cross-band of the forewing sends out a longer arm toward the base of the wing; the marginal fringes of the forewings are rather longer than usual. The very short joint (joint 6, counting the ring joint) in the male antennae is black. Structurally, the species is not different from the Australian forms.—A. A. Girault, Washington, D. C.

Habits of Spinoliella zebrata (Cresson) (Hym.).

On July 25, in the vicinity of the Bluebird Mine, in the mountains of Boulder County, Colorado, I found a great number of bees swarming in the road. They were flying rapidly over the surface of the ground, and frequently half a dozen or more would engage in a fight, tumbling over each other in the dust, in a confused mass. On catching a few, I found that they were all males, and to my great astonishment, belonged to the species *Spinoliella zebrata,* which I had never seen alive before. It is a very conspicuous bee, hardly to be overlooked, and its local abundance in a region where it had never been observed during ten years was astonishing.—T. D. A. COCKERELL, Boulder, Colo.

Some Muscoid Synonyms.

The following synonymy is offered as a matter of record:—

Clytiomyia punctata Coquillett, 1895, Jn. N. Y. Ent. Soc. III. 52-53; *Oestrophasia punctata* Coquillett, 1897, Rev. Tach. 71, equals ORMIA PUNCTATA R. D., 1830, Myod. 428.

Oestrophasia setosa Coquillett, 1902, Proc. U. S. N. M. XXV, 110, equals OESTROPHASIA CLAUSA B. B., 1889, Musc. Schiz. I. 145-146.

Senotainia fasciata Coquillett, 1897, Rev. Tach. 81, equals EUMACRONYCHIA ELITA Townsend, 1892, Trans. Am. Ent. Soc. XIX. 100.

Paraphyto Coquillett, 1895, Jn. N. Y. Ent. Soc. III, 105, apparently equals WOHLFARTIA Brauer & Bergenstamm, 1889, Musc. Schiz. I. 123. The holotype of *P. chittendeni* appears to be strictly congeneric with the European *W. meigenii* Schiner.

Polychaetoneura elvii Walton, 1914, Proc. Ent. Soc. Wash. XVI. 90-91, equals *Thryptocera americana* Townsend, 1892, Can. Ent. XXIV. 69-70, equals GYMNOPHTHALMA Lioy, 1864.

Neaera longicornis Coquillett, 1902, Proc. U. S. N. M. XXV. 106-107, equals *Clausicella usitata* Coquillett, 1897, Rev. Tach. 56, equals female SCHIZOTACHINA CONVECTA Walker, 1856, Dipt. Saund. 276.

EUHALLIDAYA *severinii* Walton, 1914, Proc. Ent. Soc. Wash. XVI. 130-132, equals BIOMYIA GENALIS Coquillett, 1897, Rev. Tach. 82-83. The two specimens referred to under the name *severinii* are both males. The female differs externally only in having the front, and especially the face, broader, outside of the hypopygium.

Tachinopsis Coquillett, 1897, Rev. Tach. 120, equals PLAGIPROSPHERYSA Townsend, 1892.

Petia Coquillett, 1910, Proc. Ent. Soc. Wash. XII. 126-127, equals CATHAROSIA Rondani, 1868. The two genotypes are so nearly identical in both structure and color that it will be difficult to define their distinctness.

It may also be mentioned that *Thryptocera dunningii* Coquillett, 1895, Jn. N. Y. Ent. Soc. III. 54, referred to *Hypostena* in 1897, Rev. Tach. 60, equals SPATHIDEXIA Townsend, 1912, the genotype of which has been determined by Coquillett as *Thelairodes cinereicollis* Wp.—CHARLES H. T. TOWNSEND, Bureau of Entomology, U. S. Dept. Agric., Washington, D. C.

Changes of Address.

Correspondents are respectfully requested to note that my address has been changed from Bureau of Science, Manila, to College of Agriculture, Los Baños, Laguna, Philippine Islands.—CHARLES S. BANKS, Associate Professor of Entomology, University of the Philippines.

Prof. RAYMOND C. OSBURN has severed his connections with Barnard College, Columbia University and The New York Aquarium to become professor of biology in the new Connecticut College for Women at New London, Conn., and may be addressed at that place hereafter.

University of the Philippines College of Agriculture, Los Baños, Department of Entomology and Zoology.

The undersigned is pleased to inform his colleagues and those Institutions which may be interested and with which cordial relations have existed in the past, that the entire Entomological Collection of the Bureau of Science at Manila has been transferred to the University of the Philippines and is now located in ample quarters at the College of Agriculture, Los Baños, Laguna, P. I., 65 kilometers from Manila by railroad.

This collection, which contains most of the types of Philippine insects, in all orders, described by European and American specialists during the past 12 or 13 years, and containing, at present, more than 300,000 pinned specimens, together with alcoholic and biological material, will be materially increased in value by the collecting of Faculty and Students in the exceedingly rich faunal regions of Los Baños, Mt. Maquiling and Mt. Banahao.

As in the past exchanges will gladly be accepted from individuals and institutions who can furnish material related to forms found in the Philippine Islands.

Identifications of insects of this region will be made, as other work permits, for Departments of the Philippine government and for all individuals who are willing to present such identified material to the college.

Entomologists visiting the Philippines will be cordially welcomed to the laboratories and every facility for their comfort will be placed at their disposal.—CHARLES S. BANKS, Associate Professor of Entomology, Chief of the Department.

A Schizoneuran Migrating from Elm to the Apple (Homop.).

Since the following observations, made by the writer during the latter part of June, 1914, furnish further evidence of the migration of elm-cluster, or elm-rosette, louse to the apple and also supply the observations, for Colorado, the lack of which led Gillette and Bragg* to state that they could not accept the conclusions of Dr. Patch that *Schizoneura lanigera* upon the apple has anything to do with the production of either the elm-curl or the elm-cluster as described by Riley, they would appear to be of especial interest at this time.

*Journal of Economic Entomology. Feb.. 1915.

June 18, 1914, several Schizoneuran migrants were observed on the under side of the leaves of water shoots about apple trees in the yard of the writer. A number of these, which were collected and examined, turned out to be migrants from the elm leaf-clusters, which were very numerous on young white elms just across the street to the east. These lice were shrunken and appeared to have deposited all of their young, but were still alive and active. An examination of the shoots revealed a number of what appeared to be Schizoneuran larvae in the axils of several of the leaves. These were in the first instar and just beginning to show the characteristic woolly secretion of the woolly apple louse. On the following Sunday, the 21st, an alate Schizoneuran was taken in the act of depositing her young on the under side of an apple leaf of the same trees mentioned above. There were three young near her on the leaf and several others were found in the axil of the leaf. This louse was also of the rosette type.

Later, lice from a leaf cluster from the elm trees mentioned were placed in a lantern globe cage in which there was an apple twig. These lice appeared perfectly content on the apple leaves and were observed to deposit their young almost as soon as placed in the cage. By July 5th the twig in this cage was nearly covered with young lice, which were so covered with the woolly secretion as to make the twig nearly white over its entire length of about six inches. At this point other work prevented the completion of the experiment. From the results of the work done the writer feels sure that *Schizoneura lanigera* and the elm-curl louse are the same, the latter being the spring form of the former.—Asa C. Maxson, Longmont, Colorado.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

3—The American Naturalist. **4**—The Canadian Entomologist. **5**—Psyche. **8**—Entomologist's Monthly Magazine, London. **11**—Annals and Magazine of Natural History, London. **21**—The Entomologist's Record, London. **22**—Archives d'Anatomie Micro-

scopique, Paris. **46**—Tijdschrift voor Entomologie. **50**—Proceedings, U. S. National Museum. **51**—Novitates Zoologicae, Tring, England. **68**—Science, New York. **81**—Biologisches Centralblatt, Erlangen. **84**—Entomologische Rundschau. **87**—Bulletin, Societe Entomologique de France, Paris. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **102**—Proceedings, The Entomological Society of Washington. **123**—Bulletin, The Wisconsin Natural History Society, Milwaukee. **128**—Proceedings, Linnean Society of New South Wales, Sidney. **131**—Proceedings of the South London Entomological and Natural History Society. **143**—Ohio Naturalist. **153**—Bulletin, The American Museum of Natural History, New York. **166**—Internationale Entomologische Zeitschrift, Guben. **173**—Die Grossschmetterlinge der Erde, Fauna Americana, von A. Seitz, Stuttgart. **175**—Aus der Natur, Berlin. **179**—Journal of Economic Entomology. **180**—Annals, Entomological Society of America. **184**—Journal of Experimental Zoology, Philadelphia. **185**—Journal, Quekett Microscopical Club, London. **186**—Journal of Economic Biology, London. **189**—Journal of Entomology and Zoology, Claremont, Cal. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. **208**—Boletin, Real Sociedad Espanola de Historia Natural, Madrid. **211**—Popular Science Monthly, Lancaster, Pa. **216**—Entomologische Zeitschrift, Frankfurt A. Main. **240**—Maine Agricultural Experiment Station, Orono. **242**—Transactions, The Royal Society of Canada, (3d Series), Ottawa. **272**—Memorias, Real Academia de Ciencias y Artes de Barcelona. **275**—Philippine Journal of Science, Manila. **304**—Annals of the Carnegie Museum. **321**—Annals of the New York Academy of Sciences. **332**—Bulletin of the Southern California Academy of Sciences, Los Angeles. **344**—U. S. Department of Agriculture, Washington, D. C. **355**—Smithsonian Institution Report, Washington, D. C. **359**—Connecticut Agricultural Experiment Station, New Haven. **369**—Entomologische Mitteilungen, Berlin-Dahlem. **394**—Parasitology, Cambridge, England. **404**—Report of the Quebec Society for the Protection of Plants. **410**—Journal of the Washington Academy of Sciences. **411**—Bulletin, The Brooklyn Entomological Society. **420**—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington. **422**—Coleopterologische Rundschau, Wien. **447**—Journal of Agricultural Research, Washington. **448**—Verhandlungen der Physikalisch-Medicinischen Gesellschaft zu Wurzburg. **475**—Bulletin de la Societe Vaudoise des Sciences Naturelles. **480**—The Annals of Applied Biology. **511**—American Forestry. **512**—Korrespondenzblatt des Naturforscher-Vereins zu Riga. **513**—South African Journal of Sciences, Cape Town. **514**—Contributions a la Faune des Indes Neerlandaises, Buitenzorg. **515**—Proceedings, American Philosophical Society, Philadelphia.

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phaga, **394**, viii, 101-27. **Marshall, W. S.**—The development of the hair upon the wings of Platyphylax designatus, **180**, viii, 53-62. **Moznette, G. F.**—Notes on the brown lace-wing (Hemerobius pacificus), **179**, viii, 350-4. **Tillyard, R. J.**—On some problems concerning the development of the wing-venation of Odonata, **128**, xxxix, 163-216.

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Confusion of Rhopalosiphum hippohaes and Myzus braggii, **179**, viii, 375-9. **Muir, F.**—A contribution towards the taxonomy of the Delphacidae, **4**, 1915, 208-12 (cont.). **Osborn, H.**—Leafhoppers of Maine [13 n. sps.], **240**, Bul. 238, 81-160. **Osborn & Drake.**—Additions and notes on the Hemiptera-Heteroptera of Ohio; Records of Guatemalan Hemiptera-Heteroptera, with descriptions of new species, **143**, xv, 501-8; 529-41. **Parshley, H. M.**—Systematic papers on New England Hemiptera, I, Synopsis of the families, **5**, xxii, 88-94. **Van Duzee, E. P.**—New genera and species of American Hemiptera [3 n. g.; 10 n. sps.], **189**, vii, 109-121.

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myiasis in man and animals—some aspects of the problem, **179**, viii, 317-29. **Felt, E. P.**—A new pest, the Chrysanthemum midge (Rhopalomyia hypogaea), **179**, viii, 267. **Keuchenius, P. E.**—Ueber den bau der internen geschlechtsorgane einiger weiblichen dipteren, **514**, i, 33-48. **Kramer, S. D.**—The effect of temperature on the life cycle of Musca domestica and Culex pipiens, **68**, xli, 874-77. **Mally, C. W.**—Note on the use of poisoned bait for controlling the house fly (Musca domestica), **513**, xi, 321-28. **Marcovitch, S.**—(See under General). **Muttkowski, R. A.**—New insect life histories. I (Psychoda cinerea & Diamesa mendotae n. sp.), **123**, xiii, 109-22. **Richardson, C. H.**—A contribution to the life history of the corn feeding syrphus fly (Mesogramma polita), **179**, viii, 338-42. **Shannon, R. C.**—Mosquitoes attacking a frog, **102**, xvii, 99. **Winn & Beaulieu.**—A preliminary list of the insects of the Province of Quebec. Part II, Diptera, **404**, vii, 107-159. **Minchin, E. A.**—Some details in the anatomy of the rat flea, Ceratophyllus fasciatus, **185**, xii, 441-46.

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COLEOPTERA. Britton, W. E.—Some common lady beetles of Connecticut, **359**, Bul. 181. **Chapman, R. N.**—Observations on the life history of Agrilus bilineatus, **447**, iii, 283-94. **Craighead, F. C.**—Larvae of the Prioninae, **344**, Off. Secty., Rept. 107. **Eichelbaum, F.**—Die larve und puppe von Cis bidentatus und die larve von Psammodes spec? nebst bemerkungen zur anatomie der larve von Caryoborus nucleorum, **369**, iv, 131-7. **Garb, G.**—The eversible glands of a chrysomelid larva, Melasoma lapponica, **189**, vii, 88-97. **Jaques, H. E.**—The fish-feeding C. of Cedar Point, **143**, xv, 525-28. **Lovell, J. H.**—The origin of anthophily among the C., **5**, xxii, 67-84. **McIndoo, N. E.**—The olfactory sense of C., **198**, xxviii, 407-61. **Nowell, W.**—Two scoliid parasites on scarabaeid larvae in Barbados, **480**, ii, 46-57. **Thilo, O.**—Das schnellen der springkaefer (Elateriden), **512**, lvii, 120-6. **Wadsworth, J. T.**—On the life history of Aleochara bilineata, a staphylinid parasite of Chorlophila brassicae, **186**, x, 1-27.

Wallis, J. B.—Popular and economic entomology. Some Manitoban water beetles, **4**, 1915, 169-74.

Bernhauer, M.—Zur Staphyliniden fauna von Sud-Amerika (12th Beitrage), **216**, xxix, 13-14. **Bryant, C. E.**—New species of Pselaphidae, sub-fam. Clavigerinae, **8**, 1915, 211-15. **Csiki E.**—Coleopterorum catalogus Pars 63; Mordellidae, 84 pp. **Fisher, W. S.**—One new genus and two n. sps. of Cerambycidae, **402**, xvii, 77-9. **Gardner, R. E.**—Elateridae from the Claremont-Laguna region, **189**, vii, 139-40. **Hopkins, A. D.**—A new genus of scolytoid beetles [Conophthorus; 14 new species], **410**, v. 429-33. **James, R. P.**—Chrysomelidae in the Claremont-Laguna region, **189**, vii, 136-7. **Obenberger, P. J.**—Einige beitrage zur kenntnis der Anthaxien, **422**, 1915, 73-83. **Pic, M.**—Trois nouveaux Chauliognathus du Bresil, **87**, 1915, 133-4. **Pierce, W. D.**—Some sugar-cane root-boring weevils of the West Indies, **447**, iv, 255-64. **Schenkling, S.**—Neue beitrage zur kenntnis der Cleriden I, **369**, iv, 107-14. Coleopterorum catalogus, Pars **64**: Derodontidae, Lymexylonidae, Micromalthidae, 19 pp.

HYMENOPTERA. **Britton, W. E.**—A destructive pine sawfly introduced from Europe (Diprion simile), **179**, viii, 379-82. **Brun, R.**—Das orientierungsproblem in allgemeinen und auf grund experimenteller forschungen bei den Ameisen, **81**, xxxv, **190-207**. **Davidson, A.**—Habits of a Cleptis (wasp), **332**, xiv, 51. **Dickel, F.**—Die geschlechtsbildungsweise bei der honigbiene wie deren grundsatzliche . . . **92**, xi, 149-54 (cont.). **Johnston, F. A.**—Asparagus-beetle egg parasite, **447**, iv, 303-14. **McColloch, J. W.**—Further data on the life economy of the chinch bug egg parasite, **179**, viii, 248-61. **Mader, L.**—Ueber das ausnehmen von wespen nestern, **422**, 1915, 84-8. **Mehling, E.**—Ueber die gynandromorphen bienen des eugsterchen stockes, **448**, xliii, 171-236. **Parker, J. B.**—Notes on the nesting habits of some solitary wasps, **102**, xvii, 70-77. **Richardson, C. H.**—An observation on the breeding habits of Stigmus conestogorum, **5**, xxii, 104-5. **Schoennichen, Dr.**—Die "Wachszange" der honigbiene, **175**, xi, 339-42.

Cockerell, T. D. A.—Descriptions and record of bees, LXVII: [6 new]; LXVIII, **11**, xv, 529-37; xvi, 1-9. **Crawford, J. C.**—A n. sp. of the genus Secodella, **102**, xvii, 100. A new sp. of the genus Chalcis, **420**, iii, 89-90. **Crosby & Matheson.**—An insect enemy of the four-lined leaf-bug (Poecilocapsus lineatus) [Cirrospilus ovisugosus], **4**, 1915, 181-3. **Forel, A.**—Formicides d'Afrique et d'Amerique nouveaux ou peu connus, **475**, l, 211-88. **Girault, A. A.**—A n. sp. of Pseudomphale from Chile, **4**, 1915, 234-5. **Marcovitch, S.**—(See under General.) **Sladen, F. W. L.**—Characters separating the species of the bee genus Coelioxys occurring in Ontario, **4**, 1915, 205-8. **Wheeler, W. M.**—Some additions to the North Am. ant-fauna [many new names], **153**, xxxiv, 389-421.

INSECTS AND MAN: An Account of the More Important Harmful and Beneficial Insects, Their Habits and Life-Histories, Being an Introduction to Economic Entomology for Students and General Readers. By C. A. EALORD, M. A. Late Principal of the East Anglian College of Agriculture. The Century Co., New York. Price $3.50 net, postage 20 cents.—The work contains 322 pages, 16 plates, 100 drawings and a bibliography. There is a brief introductory chapter followed by seven others with the following titles: Insects and Plants, Insects and Human Disease, Insect Enemies of Live Stock, Beneficial Insects, Household Insects, Some Human Parasites, Insect Control. Under insects and plants, some of the well known and more important pests are briefly discussed. The matter is given in somewhat of a narrative form and is evidently intended to create an interest in the subject. This will prove a useful book for those who wish to acquire a general knowledge of the subjects treated. Our knowledge of economic entomology in relation to man and other animals has increased so rapidly that it is impossible to treat the subject in detail in one volume. H. S. (*Advertisement*).

THE BUTTERFLY GUIDE: A Pocket Manual for the Ready Identification of the Commoner Species Found in the United States and Canada. By W. J. HOLLAND, L.L.D. Doubleday, Page and Company, Garden City, New York. Price, cloth, $1.00. Leather, $1.25.—This book measures about 6 by 3½ inches and can be readily slipped into the pocket and carried into the field. It contains 295 figures in color illustrating 255 species. The three-color half-tone reproduces butterflies with an accuracy that is truly wonderful and has greatly reduced the cost of illustrated works on butterflies and moths. Many persons were doubtless deterred from taking up the study on account of the expense of getting the necessary literature. In Europe they were more fortunate as there were a number of works at a reasonable price. Now that Dr. Holland has produced his "Guide," at the small cost of one dollar, illustrating approximately one-half the species found in the United States and northward, many more persons will be able to take up the fascinating study of these beautiful insects, particularly young people. There is an introduction in which anatomy and life history are discussed and also collecting and mounting.

The author is to be congratulated on producing an exceedingly valuable book. Some errors have crept into the work which should be corrected in another edition, such as the incorrect references to *Argynnis aphrodite* and *cybele* on pages 76 and 77 and the name of the skipper on page 215.—H. S. (*Advertisement*).

Doings of Societies.

American Entomological Society.

Meeting of June 14th, 1915, in the Academy of Natural Sciences of Philadelphia. Nine persons present. Dr. Philip P. Calvert, President in the chair.

General—Mr. Hornig related his experience with an insecticide spraying compound called "No-Bug-Atal" which he said kills all kind of insects and ticks instantly on contact. It appears to be harmless to most animals, but to cats and rodents it is said to be fatal. In all cases witnessed the spray proved successful. He also said the collecting at Alloway, New Jersey, this year was relatively very poor when compared with that of last year. Dr. Castle made some remarks on his winter trip to Florida. The winter was unusually cold and dry, so not much collecting was done until the rainy season started in February. He was then able to make some interesting captures. The extensive forest fires also destroyed some of his favorite collecting places. His ground traps did not seem to give results and upon a nocturnal investigation he discovered that toads were always on guard at the edges of the traps.

Diptera—Mr. Greene recorded the capture of *Euparyphus tetraspelus* Lw. at Roxborough, Penna. June 13th, 1915. This is the first record for the State.

Hymenoptera- Lewis H. Weld of Evanston, Illinois, presented the types and galls of *Callirhytis furnessae* Weld and *Synergus furnessana* Weld.

Mr. Greene spoke of observing the males of *Megarhyssa greenei* with their abdomens inserted in the holes made by *Tremex*. He took them to be females ovipositing until upon investigation they proved to be males.

Odonata.—Dr. Calvert spoke on the relation of the caudal gills of Odonate larvae to the development of intestinal tracheae, with special reference to the genus *Calopteryx*. He also mentioned diatoms on the legs of larvae of *Thaumatoneura* and quoted Prof. Mann, an authority on diatoms, who considered that the possible transportation of diatoms by aquatic insects would explain some puzzling cases of distribution. Dr. Calvert also exhibited a method of mounting Odonate larval exuviae on mica slides for ready examination.

E. T. Cresson, Jr., *Secy. pro tem.*

Feldman Collecting Social.

Meeting of May 19th, 1915, at the home of H. W. Wenzel, 5614 Stewart St., Philadelphia. Twelve members and one visitor present, President Wenzel in the chair.

Mr. Herman Hornig was elected a member of the Social.

Coleoptera—Geo. M. Greene exhibited a pair of remarkable Lu-

canidae from Victoria, Chile—*Chasiognathus granti* Steph. Mr. Daecke said he had found feeding a living specimen of *Trogoderma tarsale* Melsh. in his collection at Harrisburg, an unusual place for this species of Dermestidæ. Mr. H. W. Wenzel said a short time ago when Mr. Schaeffer was here he mentioned four species of Coleoptera introduced here from Europe which now have a foothold: two species of *Philonthus,* a large *Aphodius* and *Sphaeridium 2-pustellatum* Fabr. Mr. H. A. Wenzel while at Lansdowne, Delaware Co., Pa., May 1, 1915, captured two of these in large numbers: *Philonthus varians* Payk. and the *Sphaeridium.*

Lepidoptera—Mr. Daecke exhibited *Pyrgus centaureae* Ramb. and *Gonodontia obfirmaria* Hbn., both from Rockville, Pa., April 25, 1915, the latter being uncommon in this State.

Diptera-Mr. Laurent exhibited series of *Pollenia rudis* Fabr. and *Phormia regina* Meig. and stated that he had captured specimens of both species every month in the year.

Adjourned to the annex. GEO. M. GREENE, *Secretary.*

The Pacific Coast Meetings.

The Entomological Society of America met on Monday afternoon, August 2, on Tuesday, August 3, and on Thursday, August 5, in Room 113, Agriculture Hall, University of California, at Berkeley, and on Wednesday afternoon, August 4, in Room 430, Department of Zoology, Stanford University, at Palo Alto. The American Association of Economic Entomologists met on Monday and Tuesday, August 9 and 10, in Room 216, Agriculture Hall, University of California. Some entomological papers were also presented at the meetings of Section F, Zoology, of the American Association for the Advancement of Science and the American Genetic Association, August 2-3, 5-6, at Berkeley, August 4, at Palo Alto. We are indebted to Dr. Edwin C. Van Dyke, of the Entomological Laboratory of the University of California, who acted as Secretary of the Entomological Society, for information on the meetings. There was an average attendance of about thirty at most meetings of the Entomological Society; the Association of Economic Entomologists had slightly more at some sessions. Eleven papers were presented to the Entomological Society, eighteen to the Economic Entomologists, including those read by title only, which, with four others of entomological content before other bodies, make a total of 33, as compared with totals of 74, 85 and 96 for the winter convocation meetings of 1912, 1913 and 1914 respectively. A joint dinner with the Biological Society of the Pacific was held on August 4, at 7 P. M. in the Hotel Sutter, San Francisco, and was attended by many entomologists. Excursions for zoologists to Mt. Tamalpais and Muir Woods on August 7, in charge of Dr. C. Hart Merriam; to Rancho La Brea on August 13, conducted by F. S. Daggett and John C. Merriam; and to the Scripps Institution for Biological Research, were arranged.

While the papers will be published by the various societies concerned, our readers will, perhaps, like to see the titles as read, as far as we have received them, grouped according to subject, as in the NEWS for last February (page 90). Those unmarked are from the program of the Economic Entomologists, those starred (*) from that of the Entomological Society; others are designated by abbreviations of the respective Societies' names.

GENERAL SUBJECTS.—COCKERELL, T. D. A., University of Colorado, Boulder, Fossil Insects and Evolution. (Sect. F, A. A. A. S.).—MELANDER, A. L., State College of Washington, Pullman, The Pronunciation of Insect Names*.—VAN DUZEE, E. P., University of California, Priority in Family Names and Related Matters*.—VAN DYKE, E. C., ibid., The Distribution of Insects in Western North America*.—WOODWORTH, C. W., ibid., Quantitative Entomology.*

PHYSIOLOGY.—CLAUSEN, C. P., Riverside, Cal., A comparative study of a series of Aphid-feeding Coccinellidae.—DEWITZ, J., Metz, Germany, Ueber die Gifte der Pflanzenläus.—See also under "Insects Injurious to Plants," "Hemiptera" and "Hymenoptera."

GENETICS.—McCRACKEN, MARY I., Stanford University, Notes on Silk-worm Heredity, with special reference to the Moricaud Race (Amer. Gen. Assn.).

INSECTS INJURIOUS TO PLANTS.—BALL, E. D., Logan, Utah, Field Notes on Grasshopper Outbreaks, The Distribution of the Beet Leaf-Hopper.—BURGESS, A. F., Melrose Highlands, Mass., Some Phases of Gipsy Moth Work in New England.—CHILDS, L., Corvallis, Ore., Notes on Control of the Apple Leaf Roller in Oregon.—GRAY, G. P., Berkeley, Cal., Sulphur and Derivatives used as Insecticides, Rainfall and Effect of burning of trash in Sugar Cane Fields of West Indies on Injurious Insects.—MELANDER, A. L., Pullman, Wash., Varying Susceptibility of San José Scale to Sprays.—PEMBERTON, Effect of Cold Storage on the Mediterranean Fruit Fly.—WELDON, G. P., Sacramento, Cal., The Wooly Aphis as a Pear Pest.—WILSON, H. F., Corvallis, Ore., The Toxic Values of the Arsenates of Lead.

BENEFICIAL INSECTS.—SWEZEY, O. H., Honolulu, H. I., Some Results of the Introduction of Beneficial Insects in Hawaii.—See also under "Physiology."

INSECTS INJURIOUS TO MAN AND ANIMALS.—BISHOPP, F. C., Bureau of Entomology, U. S. Dept. Agric., The Distribution and Abundance of the Ox Warbles (*Hypoderma lineata* and *H. bovis*) in the United States*, A Preliminary Note on the Wool Maggots of Sheep in the United States.—ILLINGWORTH, J. F., Honolulu, H. I., Notes on the Habits and Control of Hen Fleas (*Xestopsylla gallinacea*).—SCOTT, J. W., University of Wyoming, The Insect Transmission of Swamp Fever. (Sect. F., A. A. A. S.)—ZETEK, J., Panama Canal Zone, The Reduction of Malaria by Reducing the Number of Malarial Mosquitoes within Houses.*—See also under "Diptera."

DIPTERA.—MELANDER, A. L., State College of Washington, Pullman, Review of the American Species of Scatopsidae.—HERMS, W. B., University of California, The Anopheline Mosquitoes of California, Distribution and Ecological Consideration.*—See also under "Insects Injurious to Man and Animals."

HEMIPTERA.—BALL, E. D., Agricultural College of Utah, Logan, Some Special Adaptations to Arid Conditions Exhibited by Cercopidae and Membracidae.*—WILSON, H. F., Oregon Agricultural College, Corvallis, The Tribe Pterocomini, Family Aphididae.*—See also under "Physiology," "Insects Injurious to Plants" and "Parasites of Insects."

HYMENOPTERA.—McCRACKEN, MARY I., Stanford University, Notes on California Cynipidae with Particular Reference to the Species *Diplolepis ambrosa* Full.*—WHEELER, W. M., Harvard University, On the Presence and Absence of Cocoons among Ants, The Nest-Spinning Habits of the Larvae and the Significance of the Black Cocoons of Certain Australian Species.*

PARASITES OF INSECTS.—McCULLOCH, IRENE, University of California, Flagellates of Hemiptera (Sect. F., A. A. A. S.).

Newark Entomological Society.

Meetings were held in the Newark Public Library on January 10, February 14, March 14 and April 11, 1915. President Buchholz presided at each meeting, the average attendance being ten members. Papers read—Relation of Insects to Plants as Destroyers, by Herman H. Brehme; Nursery Insects of New Jersey, by H. B. Weiss; Fleas as Carriers of the Plague, by H. B. Weiss. Mr. Weiss also exhibited three boxes of insects from all orders mounted on Mead's patented pins.

Lepidoptera.—During a discussion of the food plants of *Catocala tristis* Edw., Mr. Keller mentioned breeding *Catocala epione* Dru., on hickory. Mr. Herman Brehme added a touch of spring to the meeting of February 14th by exhibiting live specimens of *Eumaeus atala*, which had emerged from pupae received from Miami, Florida. He also showed a series of *Feralia februalis* collected February 1 at Eldridge, California. At the meeting of March 14, Mr. Mayfield showed some interesting photographs of *Catocala* eggs. On April 11, Mr. Rummel exhibited blackberry stems injured by *Papaipema cataphracta* and also cocoons of *Telea polyphemus* Cram., which contained live pupae after having comparatively large holes burned in them by fire. Mr. Rummell also reported the following captures on March 26 at Upper Montclair, N. J., by beating bushes:—*Xylina bethunei* G. & R. (7 spec.), *Scopelosoma moffatiana* Grt. (7 specimens), *S. pettiti* Grt. (2 spec.), *S. sidus* Gn. (1 spec.), on March 31, *Copipanolis cubilis* Grt.

(8 spec.), *Scopelosoma ceromatica* Grt. (1 spec.), *Jodia rufago* Hbn. (3 spec.), and one specimen of *Feralia jocosa* Gn., on trunk of hemlock tree.

Homoptera—Mr. Weiss mentioned the fact that Brood VI of the Periodical Cicada was due in New Jersey in 1915 and that locality records of its appearance would be desirable.

Coleoptera—At the meeting of February 14, Mr. Weiss read a translation of a German article dealing with the Colorado Potato Beetle in Germany, which illustrated the thorough way the German authorities took in dealing with an unwelcome importation from the United States. Among other things, it stated that military aid was secured to hunt for the beetles and engage in the work of extermination.—Harry B. Weiss, *Recording Secretary*.

OBITUARY.

Joseph Tarrigan Monell.

(Portrait, Plate XIV)

On Sunday morning, May 9, 1915, after a protracted illness, Joseph Tarrigan Monell, prominent aphidologist, passed away at his home in St. Louis, Missouri, in his 56th year. He was born in St. Louis, September 15, 1859, son of Archer and Hester (Tarrigan) Monell, both of Philadelphia and of English extraction. In 1863 he was left an orphan and became the ward of Henry Shaw, founder of the Missouri Botanical Gardens, who educated him, first in the Shaw School near the gardens and later in Smith's Academy and Washington University, at which latter institution he received the degree of Mining Engineer in 1881. During his university career he was for two years a volunteer student under Dr. C. V. Riley, then State Entomologist of Missouri, and one year a student under Dr. George Engelman, the eminent botanist.

He by profession was a Civil and Mining Engineer, his first position being with the B. & C. R. R. in Illinois, which he soon left to become chemist and assayer of a silver and refining company. Later (1882-86) he was chemist in charge of the smelters of several lead companies in Missouri. From 1886 to 1895 he was in charge of the smelting and refining plant of the Mine la Motte, near Frederichtown, Mo., which address is most familiar to entomologists, and from 1895-

Sincerely yours
J. D. Morell

1905, General Superintendent of the Central Lead Company near St. Louis. In 1905 he suffered a nervous breakdown and retired from active work. He returned to his entomological studies, in which he had been interested since his fourteenth year, in 1909 and was connected with the Federal Bureau of Entomology, as expert and collaborator in Cereal and Forage Insect Investigations until shortly before his death.

Mr. Monell was prominent as an engineer and an authority, more especially on lead poisoning, and his name was on the rolls of many engineering and other fraternities. He was also a member of the St. Louis Academy of Science and the St. Louis Entomological Society.

As a student, Mr. Monell was a leader. At the age of ten he could translate Latin and French and at fourteen was an ardent student of nature, and his interest in botany and entomology, which he acquired at this time, remained with him throughout his life. He was a keen observer and was especially interested in the Aphididae, in which group one genus and several species were named for him. He was a co-worker with Riley and Pergande, when the former was State Entomologist of Missouri, and was an early contributor to entomology, publishing his first paper, describing a new genus of Aphididae, at the age of seventeen. His largest paper (*Part II. Notes on Aphidinae with descriptions of New Species*) describing 27 new species of Aphids was written at the age of nineteen, and included in a paper *Notes on the Aphididae of the United States with descriptions of new species occurring west of the Mississippi River* by C. V. Riley and J. Monell. Part II was entirely Mr. Monell's work. His writings were clear and concise and most of the Aphids which he described as new, today stand as good and distinct species. After becoming engaged as mining engineer, he found it impossible to continue actively in insect work, although he was a constant correspondent of Lichtenstein, Pergande, and other prominent aphidologists in the early 80's and his large collection of Aphididae made during his career as an engineer is evidence of his great interest in the study. Although his published writ-

ings were few and confined to the early part of his life, his knowledge of Aphids was remarkable and his unselfishness in sharing this knowledge with his co-workers and his good-natured willingness to help anyone and everyone who applied to him for aid, places him high as a scientist. Besides the papers listed below, Monell contributed short items to most of the early American entomological publications and he has, because of his willingness to share his knowledge with others, become a contributor to many of the important papers on Aphididae. As Professor F. M. Webster has so aptly said, "Entomology has certainly sustained a serious loss as he seemed to have an inexhaustible fund of knowledge which he was always ready to impart freely to anyone whom he could assist in any way."

In 1914 Mr. Monell suffered a stroke of paralysis, and, six months later, a second stroke left his entire lower limbs helpless, although his arms and brain were perfectly normal for he mounted a slide of Aphids as late as April, 1915. Asthma, brought on from hardening of the arteries, caused his death.

He married Nellie Gifhorn September 30, 1881, who survives him, and who bore him five children, of whom three, all of St. Louis, survive him.

The Monell collection of Aphididae, which contains most of the American species, as well as many types—all on slides in balsam—and his complete notes on most of the mounts in the collection, will eventually be deposited in the United States National Museum.

Monell published the following entomological papers, describing one new genus and 32 new species:

A new genus of Aphididae. (*Can. Ent.*, Vol. 9, No. 6, June, 1877, pp. 102-103. Reprinted in *The Valley Naturalist*, Vol. 1, No. 1, Jan. 1878, p. 2.)

Describes *Colopha* nov. gen., giving *C. ulmicola* Fitch as type species, and straightens out the generic tangle.

A new species of Lachnus. (*The Valley Naturalist*, Vol. 1, No. 6, June, 1878, p. 21c)

Describes *Lachnus longistigma*, n. sp.

Notes on Aphidinae, with descriptions of new species. (*Bul. U. S. Geol. Surv.*, Vol. 5, No. 1, Pt. 2, 1879, pp. 18-32.)

The following new species are described (also redescriptions and notes on several other species): *Siphonophora achyrantes, S. calendulella, S. tulipae, S. tiliae, S. liriodendri, S. crataegi, S. sonchella, Aphis lutescens, A. calendulicola, A. hyperici, A. lonicerae, A. helianthi, Rhopalosiphum salicis, R. rhois, Callipterus ulmifolii, C. walshii, C. asclepiadis, C. discolor, C. punctata, C. hyalinus, C. betulaecolens, C. caryae, C.* (?) *quercicola, Chaitophorus viminalis, C. smithiae*, and *C. quercicola.*

The Japan lily Aphis. (Report of the Entomologist in *Ann. Rept.* (*U. S.*) *Comm. Agric.*, f. 1879 (1880), pp. 220-221. Reprinted in *The Valley Naturalist*, Vol. 2, No. 4, Dec. 1880, pp. 49-50.)

Describes *Siphonophora lilii*, n. sp.

Notes on Aphididae. *Can. Ent.*, Vol. 14, No. 1, Jan., 1882, pp. 13-16.

Notes on several species, together with descriptions of three new species, *Callipterus trifolii, Tetraneura graminis*, and *Pemphigus aceris*. Also a synoptic table of the genus *Callipterus*.

JOHN J. DAVIS, Lafayette, Ind.

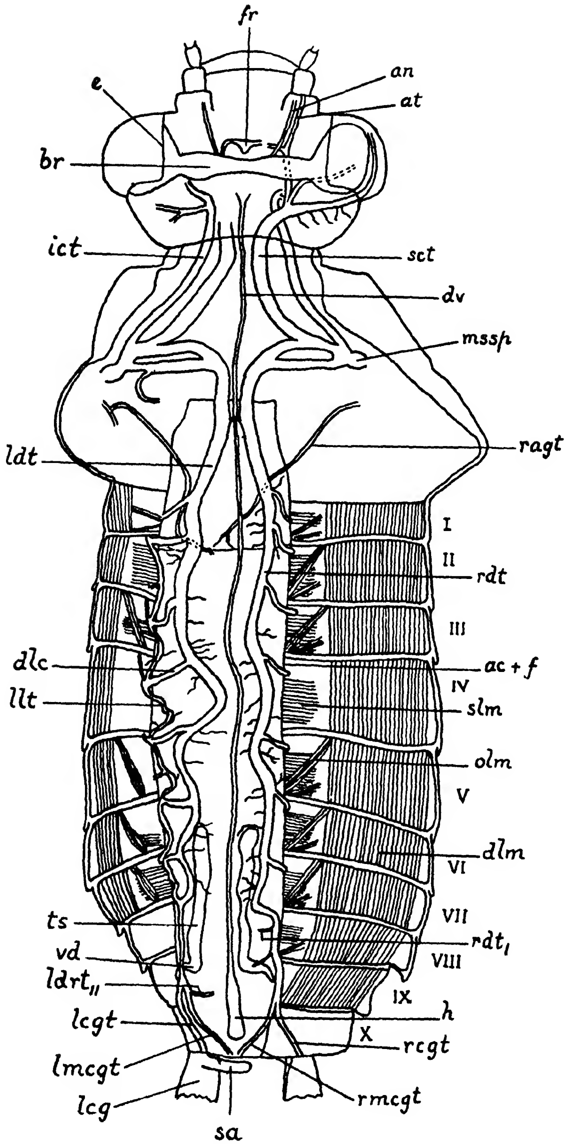
COVINGTON FEW SEISS died at his residence, 1338 Spring Garden Street, Philadelphia, September 5, 1915. He was the eldest son of the late Rev. Joseph A. Seiss, D.D., LL.D., L.H.D., a prominent Lutheran clergyman, and Elizabeth S. Seiss. He was elected a member of the Entomological Section of the Academy of Natural Sciences of Philadelphia, May 25, 1893, of the American Entomological Society, December 12, 1893, and of the Feldman Collecting Social, October 8, 1895. At that time and for some years following, he took an active part in the meetings of these bodies and in collecting local insects, especially Orthoptera and Hemiptera, as may be seen from the minutes published in contemporary volumes of the News. His literary activity was never very great, but Vol. VII of the News contains a paper by him on "The Breeding Habits of *Periplaneta orientalis*" (pp. 148-150, May, 1896), while Vol. VIII gives his brief list of Hem-

iptera on sunflower within the city of Philadelphia (p. 67, March, 1897). Prof. John B. Smith acknowledged the assistance which he derived from Seiss in the preparation of his Catalogues of the Insects of New Jersey (1900, p. 729; 1910, p. 846). Of late years, Mr. Seiss had dropped out of entomological activities altogether. His will bequeathed his book-box collection of insects to the Central High School of Philadelphia, and his reptiles, batrachia and fishes to the Academy of Natural Sciences.

Many of us recall Mr. Seiss's generosity in presenting to us desirable specimens of almost all orders of insects, which he obtained in his active collecting days, and we regret that we have seen so little of him in recent years in haunts entomological.

The death of JULIUS MAX HAGEDORN, M.D., at Hamburg, on December 15, 1914, is announced in the *Deutsche Entomologische Zeitschrift* for 1915, heft II, page 213. He was born November 28, 1852, in Ratstal, near Gerdauen, East Prussia. He studied in the University of Königsberg, and settled in Hamburg, first as a general practitioner, later as a neck, ear and nose specialist. He contributed the sections on the Ipidae for the Coleopterorum Catalogus and the Genera Insectorum. His collection was presented to the Natural History Museum in Hamburg.

The daily papers announced the death on August 20, in Havana, Cuba, of CARLOS JUAN FINLAY, promulgator of the yellow-fever mosquito fever in 1881. He was born in Puerto Principe, Cuba, December 3, 1833, and received the degree of M.D. from Jefferson Medical College, Philadelphia, in 1855 and from Havana in 1857. He was the delegate from Cuba to the International Sanitary Conference in Washington in 1881, and during 1902-8 was chief sanitary officer of that country. In 1903 he was Cuban delegate to the Sanitary Congress in Washington. Since January, 1909, he was the honorary president of the Junta National de Sanidad Beneficencia.



THAUMATONEURA LARVA—CALVERT.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXVI. NOVEMBER, 1915. No. 9.

CONTENTS:

Studies on Costa Rican Odonata.

VII. The Waterfall-Dwellers: The Internal Organs of Thaumatoneura larva and the Respiration and Rectal Tracheation of Zygopterous Larvae in general.

By PHILIP P. CALVERT, PH.D., University of Pennsylvania, Philadelphia, Pa.

(Plates XV, XVI, XVII, fig. 1)

The caudal tracheal gills of the larva of *Thaumatoneura*—to give the three most conspicuous, terminal, abdominal parts the name which they have received in other Zygopterous larvae—have been described and figured in No. VI of these Studies.* They are very clearly two-jointed, a condition which has also been described and figured by Needham† for the same parts of the larvae of *Bayadera indica,* of an unknown genus and species from Jamaica, of an unknown genus of the legion Podagrion from India and of a species of *Pseudagrion.* The resemblance between his figure (*l. c.,* pl. v, f. 4) of a lateral

*Ent. News, xxvi, pp. 295-305, pl. xi. July, 1915.
†Ent. News, xxii, pp. 145-154, pls. iv, v; pp. 342-347, pl. xi. 1911.

caudal gill of *Bayadera indica* and ours (Ent. News, xxvi, pl. xi, f. 9) of a median caudal gill of *Thaumatoneura* is very close. This two-jointed condition is of interest since these gills are homologous to the many-jointed middle tail filament and cerci of *Lepisma* and of Ephemerid larvae, while the lateral gills are homologous to the several- to many-jointed cerci of Orthoptera and of larval Perlidae (Heymons 1896, 1904). Heymons termed the median unpaired "gill" the *appendix dorsalis* and the other two the *appendices laterales,* the three collectively *appendices caudales,* applying these terms both to Zygopterous and Anisopterous larvae.

The three caudal appendages of *Thaumatoneura* larvae, although supplied with tracheae whose derivation is homologous with that of the tracheae of the lamellate caudal gills of most Agrionine larvae, present so little surface for respiration that I expected dissection to reveal some rectal tracheal gills comparable with those of the larvae of the Anisoptera. This expectation has been partly fulfilled but, as will be seen from the present paper, the rectal folds in *Thaumatoneura* larva are less numerous and each of the three folds less sub-divided and much less tracheated than is the case in Anisopterous larvae. No observations or experiments bearing directly on the methods of respiration were made on the living larvae of *Thaumatoneura.* We know that in their native waterfalls they are frequently found on rock-faces where they are kept moist, but are not submerged, by the falling water. Their movements, both at large and in our rearing glasses, were never rapid.

Internal Organs of Thaumatoneura Larva.*

Alimentary canal. The *pharynx* is separated from the oesophagus by a distinct constriction lying a little caudad to the level of the brain, but cephalad to the level of the hind margin of the head; the *oesophagus* is defined posteriorly by a constriction in the prothorax separating it from the crop (larva no. 6). The external dorsal surface of the oe-

*Owing to the destruction referred to under the heading "Description of the Larvae," Ent. News, xxvi, p. 300, no larvae specially fixed for histological study have been available, and it has been necessary to rely exclusively on larvae nos. 1-9 (*l. c.*), which were placed in alcohol as soon as their deaths were discovered.

sophagus is marked by two longitudinal streaks of blackish pigment corresponding to the areas of contact with the right and left dorsal tracheal trunks. At mid-length of the oesophagus, at the level of the hind margin of the head, is, on each lateral surface, right and left, a *salivary gland* with a delicate duct running cephalad. The *gizzard* lies in the first abdominal segment; its chitinous armature, in larva no. 4, consists of sixteen longitudinal folds, each of which bears chitinous teeth. In eight of these folds the teeth, near the posterior end, tend to increase from one to two rows, while in the other alternating eight folds the teeth are arranged in a single row throughout. The teeth of the various folds are subequal in size, but in each fold tend to become larger caudad. The formula for the gizzard armature may be written 8 (F 14-17, f 11-14)* The hind end of the *stomach* and the place of attachment of the *Malpighian tubes* lie near the articulation of the fifth and sixth abdominal segments. The *ileum* extends to the seventh segment.

The *rectal epithelium* presents three longitudinal folds, one which is dorsal and a little to the left of the median plane, a second is left latero-ventral, the third is right lateral. Their relative positions may be best seen in a cross-section of the rectum (Pl. XVII, fig. 1). The epithelium is interrupted by three, longitudinal, thinner, pigmented areas, one of which is nearlv midventral (*mvpa*) and lies immediately to the right of the attachment of the left latero-ventral fold, a second (*rlpa*) is immediately dorsal to the right lateral fold, the third (*llpa*) is to the left of the dorsal fold. These three pigmented areas are homologous with the three "non-cellular longitudinal bands" of the rectum of the larva of *Mecistogaster modestus*† and with similarly placed bands in the recta of larvae of *Lestes rectangularis, Argia moesta putrida, A. talamanca, Ischnura verticalis,* etc. Both anterior and posterior to the three longitudinal rectal folds in *Thaumatoneura* larva, the gut epithelium is very much thinner for its entire circumference, equaling, or nearly equaling, in thinness that of the three longitudinal pigmented areas, and containing also much pigment.

Tracheal System. The arrangement of the larger tracheae of the dorsal side of the body is shown in Plate XV. It corresponds, except in a few minor details, with our figure** for the tracheae of *Mecistogaster modestus* larva and those of Cole†† and of Bervoets‡ for a larva of *"Agrion."* The chief difference between the present results and those

*Cf. Higgins, Proc. Acad. Nat. Sci. Phila. 1901, pp. 132, 133.

†Ent. News, xxii, pp. 452, 453, pl. xvii, fig. 10, 1910. The description of them as "non-cellular" may not be justified when material in better condition is examined.

**Ent. News, xxii, pl. xvii, fig. 8. 1911.

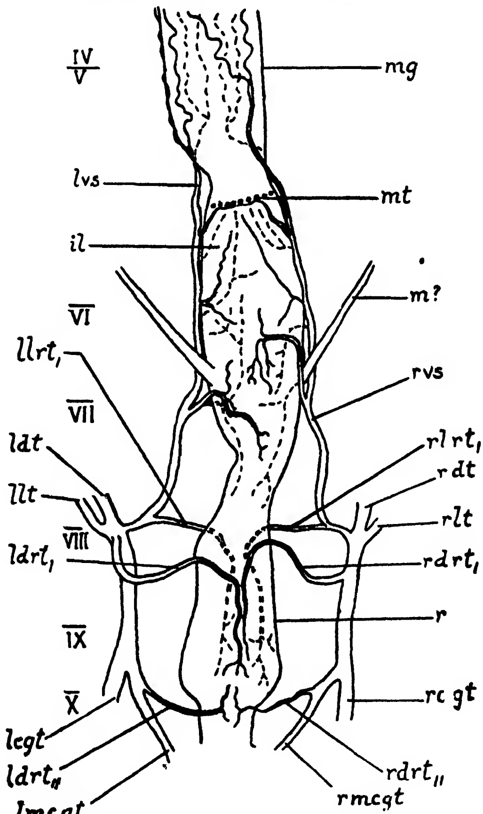
††Journ. Appl. Micros. & Laby. Meth. VI, pp. 2224-5, figs. 7, 8. 1903.

‡Annales Biol. Lacustre, VI, pp. 16, 17, 20, figs. 1-3. 1913.

of the Belgian author is that our serial sections through the posterior part of the abdomen do not show a pair of independent "ventral trunks" which he partially figures and describes.

The *tracheae which supply the rectum* have been studied by a series of transverse serial sections through the hind part of the abdomen of larvae nos. 2 and 7. In spite of the unfavorable condition of the material for a histological investigation, the tracheae were found to be intact even to branches of small diameter (.002 mm.). The rectal epithelium being in a much better state of preservation in larva no. 7, the following brief description and the figures on Plates XVI and XVII have been based chiefly upon that larva.

The two great *dorsal longitudinal tracheae,* right and left, *rdt, ldt,* each give off, in the anterior part of the eighth abdominal segment, a



Text-figure 1. The principal tracheae supplying the alimentary canal in the posterior half of the abdomen, *Thaumatoneura* larva, ♂, No. 4. Dorsal view. x 13.8 For explanation of the abbreviations, see page 394.

branch, the ***dorsal rectal trachea,*** (*rdrt*I, *ldrt*I), which runs mesad and enters the cavity of the dorsal longitudinal rectal fold. Within this fold this trachea divides and subdivides, but no anastomosis between any of the smallest subdivisions of the right dorsal rectal trachea with subdivisions of the left dorsal rectal trachea have been found, in spite of special search for them.

A short distance anterior to the origin of each dorsal rectal trachea a *lateral rectal trachea* (*rlrt*I, *llrt*I), arises, either indirectly from the dorsal longitudinal trachea (*cf.* text-figure 1 and right side of Plate XVI), or from the lateral longitudinal trachea (*cf.* left side of the same Plate), which extends mesad and caudad and enters the lateral longitudinal rectal fold of the same side of the viscus, within which it subdivides. A smaller, posterior, tracheal supply (*rlrt*II, *llrt*II) is also received by these lateral rectal folds from branches either from the lateral longitudinal trachea or from the median caudal gill trachea, as may be seen by comparing the right and left sides respectively of Plate XVI. No anastomoses of tracheoles from the anterior supply of the lateral rectal folds with those of the posterior supply have been detected.

A small posterior tracheal supply for the dorsal rectal fold is received from the right and left median caudal gill tracheae (tracheae *rdrt*II, *lrdt*II of Plate XVI). Here again no anastomoses, either transverse or longitudinal, have been found.

The only anastomosing tracheae which have been discovered are the posterior terminations of the right and left lateral longitudinal tracheae which, assuming a ventral position, meet on the mid-ventral line ventrad of the alimentary canal; in this anastomosis (*anas*) take part also a branch from the right and a branch from the left lateral caudal gill trachea. These four anastomosing tracheae, since they lie ventrad to the rectum, have been represented by lines of alternating dots and dashes in Plate XVI. A similar anastomosis in *Mecistogaster modestus* has been figured* in No. III of these studies and has been found by the writer in transparent living larvae of *Hetaerina americana, Argia moesta putrida* and *Ischnura verticalis*; it has not been figured for Anisopterous larvae and may prove to be a characteristic of those of the Zygoptera.

A comparison of the works of authors who have described the tracheae of Odonate larvae has yielded the table on page 390.

The ***terminal tracheoles,*** of the tracheae which run into the longitudinal rectal folds, enter the epithelium, although whether they merely pass between the epithelial cells or actually penetrate the latter, the condition of the material does not enable one to decide. The diameter of some of these infra-epithelial tracheoles, near their point of final

*Ent. News, xxii, pl. xvii, fig. 7. 1911.

HOMOLOGIES OF THE PRINCIPAL LONGITUDINAL TRACHEAE OF ODONATE LARVAE AS DESCRIBED AND FIGURED BY DIFFERENT AUTHORS.

Author, date, reference and species		Names of Tracheae adopted in this paper.		
		DORSAL	VISCERAL	LATERAL
Carus, 1827, Taf. II, fig. 2 and p. 15 [*Lestes sponsa*]		*d* [on left side of figure only] zwei zu beiden Seiten des Leibes verlaufende Tracheenstämme......den grossen Tracheenstämmen.		
Suckow, 1828. Taf. I, figs. 7, 9. *Aeshna grandis*		*o*, *o* zwei grosse Tracheenstämme	*q* ein geradelaufender	*p* ein dünnerer schlangenförmiger Tracheenstamm
Dufour, 1852. Pl. 5 and pp. 77-79	Fig. 28 *Aeshna grandis*	*hh*, canaux aérifères supérieures	*ii* canaux aérifères intermédiaires	Canaux aérifères inférieures (pp. 78, 79)
	Fig. 32 *Calopterix virgo*	*i* canal aérifère supérieure		
	Fig. 33 *Agrion puella*	*hh*, canaux aérifères supérieures		Canaux aérifères inférieures (pp. 78, 79)
Oustalet, 1869. Pl. 22, fig. 1. *Aeschna maculatissima*		*A*, *A* troncs supérieurs ou *dorsaux*	*BB*, troncs moyens ou *visceraux*	*C C*, troncs inférieurs ou *ventraux*
Palmén, 1877. Taf. I, fig 14 and p. 37. *Agrion.*		*trl* die beiden dorsal	Der dritte Längsstamm	*trl 1* secundären Längsstamm, den ventralen
Roster, 1885. Tav. III and pp. 260-261 *Aeschna cyanea.*		paio esterno* e dorsale; canali centrali superiori	paio viscerale; canali viscerali; tronchi viscerali	paio ventrale o laterale; tronchi ventrali o esterni*
Scott, 1905. Figs. 1, 2 and pp. 345-349 *Plathemis lydia.*		*DORS* The dorsals	*VENT* The ventrals	*LAT* Lateral system
Calvert, 1911*a*. Pl. III, fig. 22. *Cora.*		*ldt*, *rdt*, dorsal tracheae	*lpgt*, (left) posterior gastric trachea	*llt*, *rlt*, lateral tracheae
Calvert, 1911*b*. Pl. XVII, fig. 8. *Mecistogaster modestus.*		*ldt*, *rdt*, dorsal tracheae		*llt*,(left)lateral trachea
Bervoets, 1913. Figs. 1, 2. *Agrion.*		gros troncs lateraux	troncs ventraux	troncs lateraux ventraux †

* Roster has applied the terms *esterno*, *esterni*, to both of these tracheae.

† Bervoets adds (p. 18), "Cette pair de troncs... pourrait être appelée viscérale. Chez les Anisoptères, ces troncs se croisent sur le ventricule chylifique." I think, however, that he is in error in this homologization.

disappearance in the serial sections, is but .002 mm.* The manner of termination has not been ascertained.

The great majority of the tracheae in the abdomen, of all sizes from the great longitudinal trunks to the infra-epithelial tracheoles, possess an abundance of *blackish pigment* in their own epithelial layers. This pigment is evident both in entire preparations and dissections mounted in balsam and also in the sections from blocks of material embedded in paraffin, and greatly increases the ease with which these vessels may be traced. It presents the same appearance as that of the pigment in the "three, longitudinal, thinner pigmented areas" of the rectum, described above, and in other parts of the body, such as the epithelial layer of the pharynx, the connective tissue envelopes of the frontal ganglion, of the brain and of at least some of the ganglia of the ventral nerve cord.

This pigment is perhaps the same as that for which Purser (1915, p. 67) has proposed the name "spadicin" and which he suggests may have a respiratory function. His statements that spadicin "only appears in the respiratory organs of true aquatic insects" (p. 68) and "is not situated in the tracheal epithelium but in the hypodermis" [of Agrionid larval tracheal gills and in those of *Aeschna?*] (p. 69) are not entirely in accord with conditions here described for *Thaumatoneura.*

Transverse sections of the hind end of the abdomen and of *median and lateral caudal gills* show that the tracheae, supplying the latter organs do not enter them as single, relatively large trunks, but that each trachea divides and redivides into a number (four or more) of subequal tracheae which collectively pass into the base of the gill. Neither the sections of the gills nor entire mounts of these organs indicate any rich development of tracheae within them. The thickness of the chitinous cuticle of the proximal joint, as measured in cross-sections of the median caudal gill and of one lateral caudal gill of larva no. 2, varies from .012 to .016 mm., and .004 to .016 mm. respectively. There is much less blackish pigment in the epithelial layer of the tracheae of these gills than in that of the tracheae of the abdomen. Pigment is present in the epithelium of the gills themselves, but is not uniformly distributed therein.

The same sections of the median caudal gill show the presence of two median *blood spaces,* one dorso-central, the other ventro-central, situated respectively ventrad and dorsad to other blood spaces which largely occupy the mid-dorsal and mid-ventral longitudinal carinae of the proximal joint. These two central blood spaces have thin but distinct walls, contain plasma and corpuscles in their lumens and lie in the midst of a reticulated or spongy tissue; their transverse diameter, near

**E. g.,* in the dorsal fold, slide 5, row 3, section 20, of our series of larva no. 7.

the base of the gill, is about one-fifth of that of the gill itself. More posteriorly they are smaller, both relatively and absolutely, and they are not shut off from communication with other spaces. In the caudal end of the proximal joint, the two central blood spaces become confluent as one central space, whose vertical diameter is almost as great as that of the gill itself exclusive of the mid-dorsal and mid-ventral carinae. This central blood-space is continued caudad into the distal joint, occupying most of the interior thereof. The chitinous cuticle of this joint is, in these sections, .012 mm. thick.

The lateral caudal gill has a dorsal and a ventral longitudinal blood-space near the two longitudinal carinae of the mesal surface, respectively. A third appears to run along its lateral or external face.

A number of resemblances between the internal structure of the caudal gills of *Thaumatoneura* and those of *Euphaea variegata* described by Ris (1912, pp. 171-3) are evident.

Nerve ganglia. The positions of the ganglia other than the brain are as follows. The *frontal* ganglion, triangular in shape, with its apex directed caudad (Pl. XV, *fr*), lies on the dorsal surface of the pharynx a short distance (about .15 mm. in larva no. 2) anterior to the brain; it is connected on each side, right and left, with the cerebro-suboesophageal connective. *Suboesophageal* ventral to the pharynx, at the level of mid-length of the eyes. *Prothoracic* in the hind end of the prothorax, *mesothoracic* in the front part of the mesothorax, *metathoracic* in the hind part of the mesothorax; the thoracic ganglia are separated from each other by intervals shorter than the length of each. *First abdominal* in the hind part of the metathorax, *second* in the middle of abdominal segment 2, *third to seventh* in the front ends of segments 4 to 8 respectively. These positions of the thoracic ganglia are obtained from larvae nos. 2, 4, and 6, of the abdominal from larvae nos. 4 and 6.

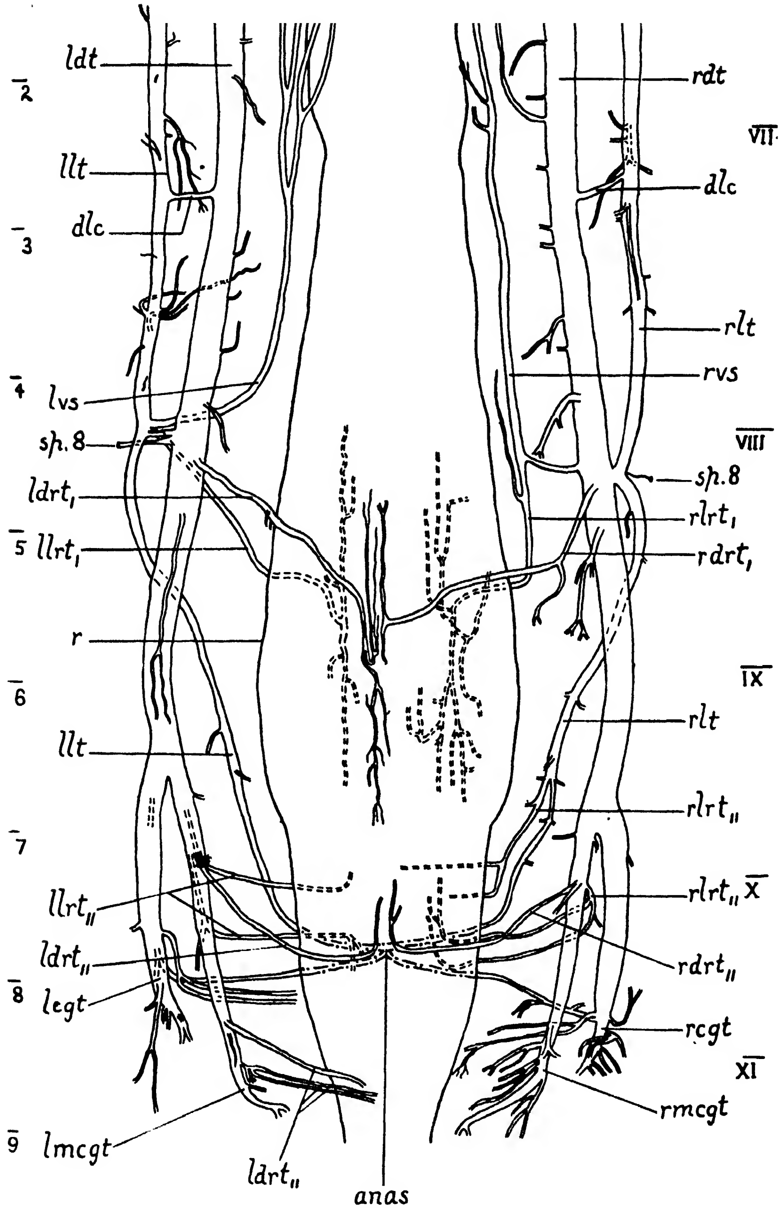
(To be continued)

Explanation of Plates XV, XVI, XVII.

Plate XV. Dorsal tracheae and some other organs of *Thaumatoneura* larva ♂, no. 4. The dorsal wall of the head has been removed except over the eyes, that of the thorax and of the abdomen has been opened longitudinally to the left of the mid-dorsal line and turned to the right. x 6.1.

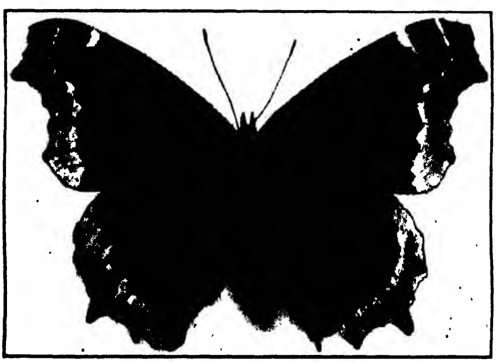
Plate XVI. Diagram of the tracheal supply of the alimentary canal in the hind part of the abdomen of *Thaumatoneura* larva, dorsal view. x 37.6.

This diagram has been reconstructed on a horizontal plane from about 850 serial transverse sections from larva no. 7, mounted on 9 slides now in the writer's collection at the University of Pennsylvania. To avoid confusing tracheae which lie approximately in the same vertical planes, the tracheae are represented farther to right and to left



THAUMATONEURA LARVA—CALVERT.

1.



2.

1. THAUMATONEURA LARVA—CALVERT.

2. VANESSA ANTIOPA ABERRATION—KEIL.

from the gut and from each other than is actually the case. The true relative positions may be learned by comparing this figure with figure 1 of Plate XVII. The origins of the various branch-tracheae and their subdivisions to the most minute branches have been indicated as exactly as possible from the sections. The tracheae which do not lie upon the gut wall or do not enter the rectal folds have not been shown farther than short distances from their origins, even though they may lie dorsad or ventrad to the gut; this for the sake of avoiding confusion. The only exceptions to this statement are in the cases of the tracheae which take part in the anastomosis (*anas*) mid-ventral to the rectum in abdominal segment X; these tracheae are indicated by lines of dashes alternating with dots, thus — . — . — . — . Of the tracheae which supply the rectal walls, those which run on the dorsal surface or enter the dorsal longitudinal fold are shown in solid lines; those which run on the ventral surface or enter the lateral rectal folds are shown in broken lines, thus — — —, as soon as they cross the outlines of the gut.

In one respect this diagram departs from the conditions shown in the sections of larva no. 7. In those sections the right lateral trachea (*rlt*) becomes much smaller in abdominal segment VII than its fellow of the left side and disappears as several minute tracheae before connecting again with the dorsal trachea. This, after comparison with other larvae, appears to be an anomaly, so that the right lateral trachea is here represented as being similar to, but not identical with, the left lateral. The branch tracheae *rvs, rlrt1*, which on the right side of the diagram come from the dorsal longitudinal trachea, are exactly as in the sections, although the corresponding tracheae *lvs, llrt1*, on the left side come from the lateral longitudinal trachea. This difference in the two sides of larva no. 7 may be due to the atrophy of the right lateral longitudinal trachea just mentioned. Compare, however, the same tracheae in text-figure 1, page 388. The right lateral trachea *is present* in the sections from its point of separation from the right dorsal in the anterior part of segment VIII as represented in the diagram.

The figures 1-9 off the left side of this plate indicate the levels of the first section of each slide, 1-9 respectively.

PLATE XVII, fig. 1. Part of photograph of section 18, row 1, slide 6, of the author's series of sections of *Thaumatoneura* larva no. 7 ♀, made with Leitz oc. 4, obj. 3, by Mr. H. A. Walters. The section is viewed from its anterior surface. x 72.5.

Abbreviations Used in Plates XV-XVII.

ac + f, outline of alimentary canal and superimposed fat masses; in Plate XV it corresponds also very nearly to the lateral edges of the sternites.

an, antennal nerve.

anas, anastomosis of tracheae in abdominal segment X.

at, antennal trachea.

br, brain.
cf, connective tissue and fat.
dlc, transverse tracheae connecting the dorsal and lateral longitudinal tracheae.
dlm, dorsal longitudinal muscles.
drf, dorsal rectal fold.
dv, dorsal vessel.
e, eye, mesal outline.
fr, frontal ganglion.
h, heart.
ict, inferior cephalic trachea (to ventral muscles of head).
il, ileum.
lcg, left caudal gill.
lcgt, left caudal gill trachea.
*ldrt*I, anterior or chief left dorsal rectal trachea.
*ldrt*II, posterior or secondary left dorsal rectal trachea.
ldt, left dorsal trachea.
llpa, left lateral pigmented area of rectum.
llrf, left lateral rectal fold.
*llrt*I, anterior or chief left lateral rectal trachea.
*llrt*II, posterior or secondary left lateral rectal tracheae.
llt, left lateral trachea.
lmcgt, left median caudal gill trachea.
lvs, left visceral trachea.
m, muscle.
mg, midgut (stomach).
mssp, mesostigma (mesothoracic spiracle).
mt, Malpighian tubes.
mvpa, midventral pigmented area of rectum.
n, nerves (in Pl. XVII, fig. 1, running caudad from last ganglion).
olm, oblique lateral muscle.
r, rectum.
ragt, right anterior gastric trachea.
rcgt, right caudal gill trachea.
*rdrt*I, anterior or chief right dorsal rectal trachea.
*rdrt*II, posterior or secondary right dorsal rectal trachea.
rdt, right dorsal trachea.
rlpa, right lateral pigmented area of rectum.
rlrf, right lateral rectal fold.
*rlrt*I, anterior or chief right lateral rectal trachea.
*rlrt*II, posterior or secondary right lateral rectal tracheae.
rlt, right lateral trachea.
rmcgt, right median caudal gill trachea.
rvs, right visceral trachea.
sa, superior appendages of imago ("cercoids").
sct, superior cephalic trachea (to antenna, brain, optic lobe and eye).

slm, straight lateral muscle.
sp.8, site of future spiracle of 8th abdominal segment.
ts, testis.
vd, vas deferens.
vlm, ventral longitudinal muscles.

The Roman numerals I-XI indicate abdominal segments 1-11 respectively.

The names of the abdominal muscles are, as nearly as possible, those employed by Matsula in Pflüger's Archiv f. Physiologie, cxxxviii, pp. 390-392, text fig. 1, 2. 1911.

An Aberration of Vanessa antiopa (Lep.).

By ERNST KEIL, Pasadena, California.

(Plate XVII, fig. 2)

The specimen figured on the accompanying plate was taken on July 7th, 1914, at Granville, Ohio, on the Denison University campus by the writer. It was captured in the morning sitting on the trunk of a walnut tree which was one of a large number of trees that had been sugared the night before. The specimen had been enjoying the remains of the night's banquet. There were other specimens of *Vanessa antiopa* captured at the same place and time which were all normal. The specimen in question expands 70 mm., three wings are normal and have the ornamentation of a male specimen. The left hind wing, however, has the blue dots missing altogether, the yellow edge is about 2 mm. broader than the edges of the other wings and is of a whitish yellow. The rest of the wing is dull black instead of reddish brown, and the vein structure is exactly the same as that of the other wings.

Do Insects Migrate Like Birds?

Under this title, Howard J. Shannon discusses in *Harper's Monthly Magazine* for September, 1915, the observed migrations, both northward and southward, in the United States, of the monarch butterfly and of dragonflies like *Anax junius*. He briefly sums up the European data also, on swarms of Odonata. He considers that insects in migration follow much the same routes as do the birds, and concludes that "accumulating evidences show that the principles and laws governing the better-known bird migrations have a remarkable parallel in the annual movements of certain members of the insect world."

A New Trichogrammatid from Trinidad (Hym.).

By A. A. Girault, Washington, D. C.

Uscana pallidipes new species.

Female.—Length, 0.55 mm. Black, the legs, head and thorax pale golden yellow, except for a large, triangular black area from cephalic margin of scutum to about middle, divided along the meson by yellow and not extending to lateral margins. Fore wings distinctly infuscated out to the end of the stigmal vein.

Marginal fringes of caudal wing distinctly longer than the greatest width of the blade, the latter bearing a single, complete line of discal ciliation a little cephalad of the middle. Fore wings with about 4-7 setae in the oblique line of discal cilia from the stigmal vein, with about seven complete, regular lines of discal cilia from apex to a line drawn across apex of the venation (a few short lines between the others distad), the marginal cilia longer than usual (about a little over one-fourth the greatest wing-width, uniform and longest around the rather broadly flattened apex, the blade widest just proximad of apex), the marginal ciliation somewhat shorter than that of the hind wings. Stigmal vein not quite half the length of the marginal, the latter distinctly over half the length of the submarginal and with a number of short setae from its surface. A patch of 6-12 minute setae (the cephalic 2-3 larger) near caudal margin about opposite middle of the marginal vein.

Pedicel stout, somewhat longer than wide, not half the length of the club. Club with rather long, scattered setae, acuminate, without a terminal spine. Scape slender, not long. Tarsal joints not long. Abdomen short, conic-ovate, the ovipositor inserted at about the middle.

Male.—The same, except for the different shape of the abdomen.

Described from five males, one female marked "Horiola sp. Pt. Spain. P. Lachmere-Guppy. Letter November 27, 1911." The fourth trichogrammatid from *Horiola* eggs.

Habitat: Port of Spain, Trinidad, West Indies.

Type: Cat. No. 19,131, U. S. National Museum, Washington, one female on a slide with a male allotype and paratype. A second slide with three males in same collection.

Differs markedly from *semi-fumipennis* (types compared) in having the legs all pale, the wings distinctly narrower and much less ciliated discally, the marginal cilia distinctly much longer, also the marginal vein, the caudal wings bear only one line of discal cilia (three in the genotype), the stigmal vein is not half the length of the marginal (more than half in the genotype), the stigmal vein is not darkened as in the other and the general coloration is somewhat different (the yellow coloring of the thorax duller in the genotype).

This species has the general appearance of *Tumidiclava pulchrinotum* Girault when viewed with a hand lens, but the club is not swollen and the stigma vein is normal.

Dermaptera and Orthoptera Found in the Vicinity of Miami, Florida, in March, 1915—(Part 1).

By MORGAN HEBARD, Philadelphia, Pa.

(Plate XVIII.)

From the 3d to the 16th of March, 1915, the author was in Miami, Florida, during which time collecting was only undertaken part of each day, but special efforts were made to secure material of the least known forms. In this way, while a mere representation of the well known species was taken, certain particular areas were very thoroughly and repeatedly investigated and several most interesting facts were thereby ascertained. A series of 654 specimens was taken, which material is now in the Hebard Collection.[1] This series represents 72 forms of which 2 are new and 5 previously not known from southern Florida, 2 of these latter constituting first records for the United States.

The region under consideration is divided into a number of distinctive areas, of which the "hammock" and the red mangrove swamps received the most thorough investigation. The facts concerning the various areas may be set forth as follows:

"HAMMOCK."[2]

The heavy jungle areas, called in the vernacular "hammocks," and small areas of which, scattered through the pine woods of this region, are generally known as "banana-holes,"[3] contain a number of most interesting species of Orthoptera, particularly of the tropical forms. Individuals of these are, however, almost without exception very scarce and certain spe-

[1] In addition, 22 other specimens from this region are here recorded. Mr. Rehn and the present author have already recorded 4481 specimens of Orthoptera from central and southern Florida. (1905. Proc. Acad. Nat. Sci., Phila., 1905, pp. 29-55; 1912. Ibid., 1912, pp. 235-276; 1914. Ibid., 1914, pp. 373-412, and 1914. Jour. N. Y. Ent. Soc., XXII, pp. 96-117. The great majority of this material is in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia.

[2] One of the most extensive "hammocks" in southern Florida was particularly investigated; this is Brickell's Hammock, which occupies several square miles of territory between Miami and Cocoanut Grove and is readily accessible from the former place.

[3] See J. W. Harshberger. Trans. Wagner Free Inst. Sci., Phila., VII, p. 101. (1914.)

cies can only be secured after repeated and long-continued investigations with trowel and beating net. The interesting species of the Tettigoniidae found here were, at this time of year, without exception in the earlier stages of immaturity. Under the bark of certain lofty trees growing in this hammock, particularly *Exothea paniculata* and *Coccolobis laurifolia*,[4] a number of very interesting forms were found hidden during the day. These could best be collected by tearing loose patches of bark off with a trowel and holding a beating net beneath at the same time. Six molasses jars were placed in this hammock, but little material was secured in this manner. During this visit unprecedentedly cold weather was encountered which made night work either unsatisfactory or wholly out of the question. In warm weather this method would certainly prove one of the readiest means to secure a number of the desirable species.

Mangrove Swamps.[5]

These areas were found to be by no means as barren of Orthoptera as we had supposed. Two peculiarly Antillean species of Gryllidae were found in and along their borders and, in addition, an undescribed species of this family was found in the deep shade among the mangrove roots. A very few specimens of other species of Orthoptera were encountered in this environment, while everywhere above in the foliage of the mangroves a Gryllid, ubiquitous in green foliage wherever found in southern Florida, was heard. In summarizing we would state that Orthoptera are generally very scarce in these swamps, but certain of the species are not found elsewhere and occasionally a species is found there locally abundant. The deep shade, labyrinth of roots and presence in unpleasant numbers of mosquitoes, even as early as March, make work in these areas unusually difficult.

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[4] For the botanical determinations in the present paper we wish to express our hearty thanks to Mr. Stewardson Brown of the Academy of Natural Sciences of Philadelphia.

[5] We here refer only to the red mangrove, *Rhizophora mangle*. In areas of black mangrove, *Avicennia nitida*, or open marshy flats, covered with the shoots of this tree, none of the species of Orthoptera here recorded have been encountered.

Pine Woods.

A great portion of the region is covered by pine woods, *Pinus caribaea.* This area is very open, the ground is extremely rough, being composed in most places of oölitic limestone and is carpeted with a large variety of low vegetation in which the wire grass and saw palmetto are everywhere found. Considerably larger series of Orthoptera could be taken in these woods during March than elsewhere, but as the majority of the species were already well known to us, but little time was given on this trip to this area. A number of interesting captures were, however, made.

Salt Marshes and Everglades.

These two areas were most unproductive, almost all of the abundant Tettigoniidae found in the Fall not being yet apparent, even as tiny immature individuals.

Sea Beaches.

But one species of Acridid is found on the sand beaches, but back of these in the halophytic vegetation, *Ipomaea pes-caprae, Canavalia lineata* and other plants, a number of species were encountered. Individuals of several of these were of interest in being of decidedly larger average size than material from inland situations.

DERMAPTERA.

Anisolabis annulipes (Lucas). Brickell's Hammock, Miami, III, 4, 1915, (H.), 1 ♀.

Labidura bidens (Olivier). A crushed individual of this species was seen on the sidewalk at Miami.

Prolabia unidentata (Beauvois). Southside, Miami, III, 6, 1915, (H.), 4 ♀.

This species was found abundant under the dried bark of all of the logs of *Pinus caribaea* examined.

ORTHOPTERA.

Blattidae.

Ischnoptera deropeltiformis (Brunner). Brickell's Hammock, Miami, III, 4 to 15, 1915, (H.; trapped in molasses jar), 2 juv. ♂.

Blattella germanica (Linnaeus). Common in habitations at Miami.

Ceratinoptera diaphana (Fabricius). Brickell's Hammock, Miami, III, 4, 1915, (H.; under loose bark on trunk of tree, *Exothea paniculata,* in dense jungle), 1 juv. ♀.

Ceratinoptera lutea Saussure and Zehntner. Brickell's Hammock, Miami, III, 3, 1915, (H.; on ground under luxuriant undergrowth in opening in forest), 1 ♂. Virginia Key, III, 11, 1915, (H.; in dark water-soaked leaves in heavy red mangrove swamp), 1 juv. ♂.

Eurycotis floridana (Walker). Brickell's Hammock, Miami, III, 4 to 15, 1915, (H.; trapped in molasses jars), 1 ♂, 2 ♀, 3 juv. ♂.

This unpleasant roach was found particularly numerous in tree cavities and under bark along the edge of the hammock. It was the only species found attracted to the molasses jars in numbers.[6]

Periplaneta australasiae (Fabricius). Southside, Miami, III, 16, 1915, (H.; a few juv. under bark of dead logs of *Pinus caribaea* in company with numbers of *Prolabia unidentata*), juv. ♀.

This is the only household pest which, in this region, appears frequently numerous outside of dwellings as well.

Pycnoscelus surinamensis (Linnaeus). Brickell's Hammock, Miami, III, 4, 1915, (H.), 1 juv. ♀.

In this region, the present species is ubiquitous on the ground under litter of any sort. At Musa Isle, it was found burrowing in the sand when search was being made for *Scapteriscus abbreviatus.*

Plectoptera poeyi Saussure.

We have a male before us in the Hebard Collection from Cocoanut Grove, Florida, taken in 1887 by E. A. Schwarz. The species has not been previously recorded from the United States except from Key West, Florida.

MANTIDAE.

Stagmomantis carolina (Johannson). Brickell's Hammock, Miami, III, 3, 1915, (H.; juv. occasional in heavy vegetation along edges of openings in hammock), 2 juv.

Gonatista grisea (Fabricius). Brickell's Hammock, Miami, III, 4, 1915, (H.; juv. rare on trunks of trees), 1 juv. Virginia Key, III, 11, 1915, (H.; on roots of mangrove in dense mangrove swamp), 1 juv.

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[6] A number of specimens secured were not retained.

The latter specimen here recorded was much darker in general coloration than is normal for the young of this species.

Oligonyx scudderi Saussure. Southside, Miami, III, 16, 1915, (H.; undergrowth in pine woods), 1 juv. ♀.

The species has never before been recorded from a definite locality in this state.

Thesprotia graminis (Scudder). South of Brickell's Hammock, Miami, III, 3, 1915, (H.; undergrowth of pine woods), 1 juv. ♀. Southside, Miami, III, 6, 1915, (H.; in gallberry bushes in pine woods), 3 ♀.

PHASMIDAE.

Manomera tenuescens (Scudder). Southside, Miami, III, 6, 1915, (H.; in low bushes in undergrowth of pine woods), 1 juv. ♂, 1 juv. ♀.

Anisomorpha buprestoides (Stoll). Southside, Miami, III, 6, 1915, (H.; young in early stages occasional in undergrowth of pine woods), 1 juv. ♀.

ACRIDIDAE.

Neotettix femoratus (Scudder). Southside, Miami, III, 6, 1915, (H.; occasional in spots of scant vegetation in pine woods), 4 ♂, 4 ♀, 1 juv. ♀. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; occasional on edge of salt marsh), 4 ♂, 2 ♀.

Of this series, three males alone are typical of *femoratus;* the others show to varying degrees the condition found in *Neotettix bolteri,* which is most strongly marked in one female. One male and four females have the pronotum caudate.

Tettigidea spicata Morse. Miami, III, 3 and 10, 1915, (H.; in short grass), 1 ♂, 2 ♀. Brickell's Hammock, Miami, III, 4, 15 and 16, 1915, (H.; in openings in hammock, in and on edge of red mangrove swamp), 4 ♂, 5 ♀. Cape Florida, Key Biscayne, III, 12, 1915, (H.; in red mangrove swamp), 1 ♀.

The dark bare soil along the edges of the red mangrove swamps was the situation in which the greatest number of specimens of this rather scarce species were found.

Tettigidea lateralis lateralis (Say). Brickell's Hammock, Miami, III, 15, 1915, (H.; dark soil on edge of red mangrove swamp), 1 ♂.

Radinotatum brevipenne peninsulare Rehn and Hebard. Southside, Miami, III, 6 and 16, 1915, (H.; undergrowth of pine woods), 7 ♂, 8 ♀, 1 juv. ♀. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; undergrowth of pine woods), 2 ♂, 1 juv. ♂, 1 juv. ♀.

This species was everywhere found in the undergrowth of the pine woods, the majority of specimens being adult.

Macneillia obscura Scudder. Southside, Miami, III, 6 and 16, 1915, (H.; undergrowth of pine woods), 5 ♂, 7 ♀, 2 juv. ♂, 8 juv. ♀.

This series exhibits a wonderful diversity of the striking and beautiful color pattern and colorations found in the species, no two specimens being exactly alike but the females showing the greatest differences. Those with the very pale medio-dorsal stripe and those with green lateral markings are the most striking of these. The insect was found widely distributed through the undergrowth of the pine woods but always in few numbers.

Amblytropidia occidentalis (Saussure). Southside, Miami, III, 6, 1915, (H.), 3 ♂. South of Brickell's Hammock, Miami, III, 3, 1915, (H.), 2 ♂, 1 juv. ♂.

The species was not abundant in the undergrowth of the pine woods.

Orphulella pelinda Burmeister. North border of Brickell's Hammock, Miami, III, 4, 1915, (H.; undergrowth in live oak groves), 1 juv. ♀. Southside, Miami, III, 16, 1915, (H.; undergrowth of pine woods), 1 ♂.

But one adult of this species, which later appears in large numbers, was found.

Arphia granulata Saussure. Southside, Miami, III, 6 and 16, 1915, (H.), 7 ♂, 5 ♀. South of Brickell's Hammock, Miami, III, 3, 1915, (H.), 2 ♂, 1 juv. ♀.

This species was widely distributed through the undergrowth of the pine woods but always few in numbers. The males show some diversity in coloration, the females considerably more.

Chortophaga australior Rehn and Hebard. Miami Beach, III, 7 and 12, 1915, (H.; moderately numerous locally in halophytic vegetation along beach), 5 ♂, 6 ♀, 1 juv. ♂. North

border of Brickell's Hammock, Miami, III, 4, 1915, (H.; adults occasional, young abundant in undergrowth of live oak groves), 1 ♂. Cape Florida, Key Biscayne, III, 12, 1915, (H.), 1 very small juv. ♀.

The specimens from Miami Beach are very large for this species, a condition even more pronounced in *Aptenopedes sphenarioides clara.*

Pardalophora phoenicoptera (Burmeister). Southside, Miami, III, 6, 1915. (H.; undergrowth of pine woods), 1 juv. ♀.

A decided lamellation of the dorsal and ventral margins of the caudal femora is noticeable in this specimen. The coloration of the caudal limbs is very brilliant. The species was previously known from peninsular Florida only from Lakeland.

Scirtetica marmorata picta (Scudder). Miami Beach, III, 7 and 12, 1915, (H.; very scarce and local in sand areas back of beach proper), 3 ♂, 1 ♀, 2 juv. ♀. Southside, Miami, III, 6, 1915, (H.; one colony found in sandy area in pine woods), 3 ♂, 1 ♀. Musa Isle, III, 10, 1915, (H.; sandy soil in grapefruit grove), 1 juv. ♀.

The females from Miami Beach are unusually pinkish in general coloration with darker markings greatly reduced.

Psinidia fenestralis (Serville). Miami Beach, III, 7 and 12, 1915, (H.; scarce and local in sandy areas back of beach proper), 4 ♂, 3 ♀, 1 juv. ♀. Southside, Miami, III, 6, 1915, (H.; adults and young scarce in sandy spot in pine woods), 1 ♀.

Trimerotropis acta[7] new species. (Pl. XVIII, figs. 1A-1E).

1905. *Trimerotropis maritima* Caudell (not *Locusta maritima* Harris, 1841), Ent. News, XVI, p. 218. [Palm Beach, Florida.]

1914. *Trimerotropis citrina* Davis (in part not of Scudder, 1876), Jour. N. Y. Ent. Soc., XXII, p. 195. [Ocean Beach (Miami Beach), Florida.]

The present species is closely related to *T. maritima* and *T. citrina.* When compared with the former it is found to average smaller. The lateral carinae of the frontal costa are normally not as distinct below the median ocellus. The lateral lobes of the pronotum are more compressed cephalad of the principal sulcus, with the disk at this point more distinctly narrowed as a result, and with caudal margin of disk less produced, the angle being normally rectangulate. The tegmina are proportionately similar but not as long relatively when compared

[7] From ἀκτὴ = the strand.

with the body length; when in repose the anal fields of the tegmina are similarly deplanate with coloration normally paler and less maculate than the discoidal and marginal fields. When compared with *citrina* the present insect is found to be more robust. The frontal costa is slightly wider and also shows the same feature of the lateral carinae as given above. The lateral lobes of the pronotum are much more compressed cephalad of the principal sulcus, with disk at this point much more distinctly narrowed as a result, but with caudal margin of disk similar (in *citrina* the caudal angle of the disk is, however, more frequently slightly less than rectangulate). The tegmina in *citrina* differ in being proportionately wider and also relatively more elongate when compared with the body length, and in having the anal fields when in repose not as strikingly deplanate with coloration the same as the remaining portions. The caudal femora are similar in the two species.

The coloration and markings of this species are normally distinctive. The caudal tibiae in all of the material before us are scarlet (60% red, 40% orange), in *citrina* these portions are grenadine red (40% red, 60% orange). As in *maritima,* this species has the internal faces of the caudal femora pale yellowish with two dark bands, with genicular areas not at all or but little suffused; in *citrina* the coloration of these portions is similar but with the genicular areas normally black.

Type: ♀; Miami Beach, Florida. March 7, 1915. (Hebard). [Hebard Collection Type No. 405.]

Description of Type. Size medium, form moderately robust for the genus. Head similar to that of *maritima,*[8] with face even smoother and less pitted than in that species. Pronotum rather short, prozona distinctly compressed this greatest at the cephalic dorsal suture, metazona deplanate. Median carina not strongly but distinctly bicristate on the prozona, the cephalic slightly longer than the caudal crest but of equal height; of almost equal height cephalad but very gradually less prominent caudad on the metazona. Lateral carinae well developed on metazona but continued well defined by the color pattern only on metazona. Tegmina moderately elongate, proportionately narrow. Wings of much the same proportions as in *maritima;* wing band narrow but solid, with greatest width in the radiate field, 4. mm. Caudal femora as in *citrina.* Coloration distinctive.

Allotype: ♂; same data as type but taken March 12, 1915.

Description of Allotype. Very similar to type but smaller, agreeing in all other characters given except width of wing band which is in greatest width in the radiate field, 4.7 mm.

In addition to the type and allotype, the series of 34 males

[8] A difference in the frontal costa, discussed above, is well indicated in this specimen; this difference, though slight, is indicated in the majority of specimens of the present species before us.

and 19 females from the same locality may be considered paratypes.

Measurements (in millimeters)

	♂		♀		♂	♀
					Capron, Fla.	
	ALLOTYPE	PARATYPES[9]	TYPE	PARATYPES		
Length of body	21.8	21.7-24	27.4	27.3-31.2	20.8	28.9
Length of pronotum	4.4	4.4-5	5.5	5.2-6	3.9	5.4
Caudal width of pronotum	3.7	3.6-4	4.8	4.4-5.1	3.3	4.6
Length of tegmen	24.3	22.6-24.4	28.	27.-30.9	22.8	29.6
Greatest width of tegmen	3.8	3.6-4.3	4.7	4.6-5.2	3.5	5.
Length of wing	21.5	20.7-25	24.8	24.8-28.9	—	—
Greatest width of wing	11.8	11.3-13.9	13.4	13.4-15	—	—
Length of caudal femur	12.6	12.6-13.7	14.8	15.-16.4	12	15.2

Coloration. Ochraceous buff to apricot buff in general coloration. The anal fields of the tegmina are usually immaculate, occasionally weakly washed with white, rarely weakly speckled with darker buff in specimens of darkest coloration. The discoidal and marginal fields of the tegmina are of the general coloration, usually much suffused with a speckling of darker buff, these markings concentrating to form two weakly defined darker bands. The pronotum is normally greatly suffused with white except along the lateral borders of the dorsum and on the dorso-caudal portions of the lateral lobes with the characteristic small median depression very dark. The head is heavily suffused with white except for two narrow post-ocular bands. Antennae and limbs suffused with white, with two conspicuous dark bands on the caudal femora and the genicular areas of the same dark buffy. Inner faces of caudal femora yellowish, heavily twice banded with black but with genicular areas not at all or but little darkened. Caudal tibiae scarlet, this color fading to white near the proximal extremity. Wings with proximal portion marguerite yellow individually varying to reed yellow, margined distad with a broad continuous black band, this not interrupted normally except very briefly before the elongate spur. Remaining distal portion of wings hyaline with tip often weakly suffused with black. Immature individuals are even more heavily suffused with white but with color pattern (darker narrow post-ocular bars, margining of disk of pronotum and bands of caudal femora) strongly defined.

The species was found widely distributed but few in numbers everywhere along the middle and upper ocean beaches at Miami Beach. Individuals were encountered without exception on loose sand either along the landward border of the middle beach or less often immediately back of this in areas

[9] Of this series the two largest specimens were taken in September.

of high seaside oats, *Uniola paniculata.* At Palm Beach a few individuals were observed under similar conditions. The flight of this insect much resembles that of *maritima* and is more direct than that of *citrina.*

Specimens examined: 79; 38 males, 23 females, 7 immature males and 11 immature females. Capron,[10] IV, 10 and 19, 2 ♂, 1 ♀, [U. S. N. M.] Palm Beach, III, (A. N. Caudell), 1 ♂, 1 ♀, [U. S. N. M.]; III, 8, 1915, (H.), 1 ♀, 1 juv. ♂. Miami Beach, III, 7 and 12, 1915, (H.), 30 ♂, 17 ♀, TYPE, *allotype* and *paratypes,* 6 juv. ♂, 11 juv. ♀; IX, 23, 1913, (W. T. Davis), 5 ♂, 3 ♀, *paratypes,* [Davis Cln.].

Stenacris vitreipennis (Marschall). Southside, Miami, III, 6, 1915, (H.; dry undergrowth of pine woods), 2 ♂, 1 ♀.

It was surprising to find these specimens in the above situation as we had hitherto always found the insect only in reeds growing out of water in swamps, marshes and sink-holes.

Leptysma marginicollis (Serville). Miami Beach, III, 12, 1915, (H.; boggy depression on palmetto flats), 1 ♂. Southside, Miami, III, 16, 1915, (H.; dry undergrowth of pine woods), 3 ♂, 1 ♀.

The comment made upon the last species, applies to some of these specimens as well. This species, however, usually prefers reeds on boggy ground rather than those growing out of water.

Schistocerca serialis (Thunberg).

Schistocerca americana of authors.

Drury in 1775 described and figured this species as *L*[*ibellula*] *americana,* Ill. Nat. Hist., I, p. 128, pl. xlix, fig. 2, name in index. This is preoccupied by *Libellula americana* of Linnaeus, Syst. Nat., ed. x, p. 545, 1758. The next name to apply to Drury's *L. americana* is *Gryllus serialis* of Thunberg, Mém. Acad. Imp. Sci., St. Petersbourg, V, p. 241, 1815, described from St. Bartholomew, British West Indies, which name consequently must be used for this species.

Miami Beach, III, 7, 1915, (H.), 1 ♂. South of Brickell's Hammock, Miami, III, 3, 1915, (H.), 1 ♀.

This species was found occasional through the pine woods, in the hammock and frequently in considerable numbers in the vegetation back of the sea beaches.

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[10] This refers to the abandoned Fort Capron, which was located near the present town of Viking.

Schistocerca damnifica calidior Rehn and Hebard. Southside Miami, III, 6, 1915, (H.; occasional through undergrowth of pine woods), 8 ♂, 1 ♀.

Eotettix signatus Scudder. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; edge of salt marsh), 1 very small juv. ♂, 1 very small juv. ♀. Homestead, III, 17 to 19, 1910, (H.; edge of everglades), 3 very small juv. ♂.

These tiny specimens in no way resemble the adult insect, but would rather suggest the immature condition of some remarkable tropical form. The generic status is, however, certain from specimens before us showing other immature instars, and, as *signatus* is very abundant in this region and situation later in the season and the only species of the genus known from southern Florida, there seems little doubt of the proper specific identity.

Melanoplus puer Scudder. Miami Beach, III, 7 and 12, 1915, (scarce and local in beach vegetation back of strand), 4 ♂, 2 ♀. Southside, Miami, III, 6 and 16, 1915, (H.; widely distributed and locally common in undergrowth of pine woods), 14 ♂, 8 ♀. Virginia Key, III, 11, 1915, (H.; in beach vegetation back of strand), 1 ♀. Cape Florida, Key Biscayne, III, 12, 1915, (H.; back of beach in low strand vegetation), 1 very small juv. ♂.

The specimens from Miami Beach average slightly larger than those from the mainland.

Paroxya atlantica atlantica Scudder. Southside, Miami, III, 16, 1915, (H.; adults occasional, young abundant in undergrowth of pine woods near hammock), 1 ♂, 1 ♀. South of Brickell's Hammock, Miami, III, 3, 1915, (H.), 2 ♂, 1 ♀.

Aptenopedes sphenarioides clara Rehn.[11] Miami Beach, III, 7 and 12, 1915, (H.; adults locally common, young in early stages generally more numerous, back of beach in low strand vegetation), 16 ♂, 12 ♀, 1 juv. ♂, 1 juv. ♀. Southside, Miami, III, 6, 1915, (H.; occasional in undergrowth of pine woods), 2 ♂, 3 ♀, 2 juv. ♂, 1 juv. ♀. Brickell's Hammock, Miami, III, 3, 1915, (H.; luxuriant undergrowth in opening of ham-

[11] Study of other Floridian geographic races and the large series of this insect in the collections before us offers convincing evidence of the racial status of *clara*. It is our opinion that absolutely intermediate material, proving this relationship, will be found in north central Florida when that region is investigated.

mock), 1 very small juv. ♂. Virginia Key, III, 11, 1915, (H.; back of strand in low beach vegetation), 1 juv. ♂. Cape Florida, Key Biscayne, III, 12, 1915, (H.; luxuriant vegetation in clearing), 1 ♂.

This series is of particular interest, owing to the added evidence which we have from it on the decided size variation in this race, due wholly to local environmental conditions. Males previously taken on Key Biscayne and the present specimen from that locality average decidedly larger than any other series we have seen, while the material from Miami Beach also averages distinctly larger than that from the pine woods near Miami.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
Miami Beach (16)..............	22. -24	4.2-4.8	3.7-4.7	11.8-13
Southside, Miami (2)..........	20.3-21.7	3.9-4.1	4.1-4.4	11.3-11.7
Key Biscayne (3)..............	25.3-27.4	5.2-5.8	5.6-5.9	14.3-16
♀				
Miami Beach (12)..............	30. -34.9	5.7-6.7	5.2-5.6	14 -17.3
Southside, Miami (8)..........	26. -26.7	5.1-5.2	4.7-5	12.9-13.7
Key Biscayne (3)..............	31.7-34.3	6.1-6.8	5.8-6.8	14.6-16.9

The males before us are all green, or green suffused with reddish. The females exhibit wood brown, ferruginous brown and green color phases.

Aptenopedes aptera Scudder. Southside, Miami, III, 6 and 16, 1915, (H.; occasional especially about low bushes in undergrowth of pine woods), 3 ♀, 3 small juv. ♂, 1 juv. ♀.

One of these females is as large as any of the species we have seen; length of body 33; of pronotum 7.7, of caudal femur 15.9 mm.

Explanation of Plate XVIII.

Fig. 1A. *Trimerotropis acta* new species. Miami Beach, Fla. Female (TYPE). Lateral view. (X1½).

Fig. 1B. The same. Cephalic outline of head. (X2).

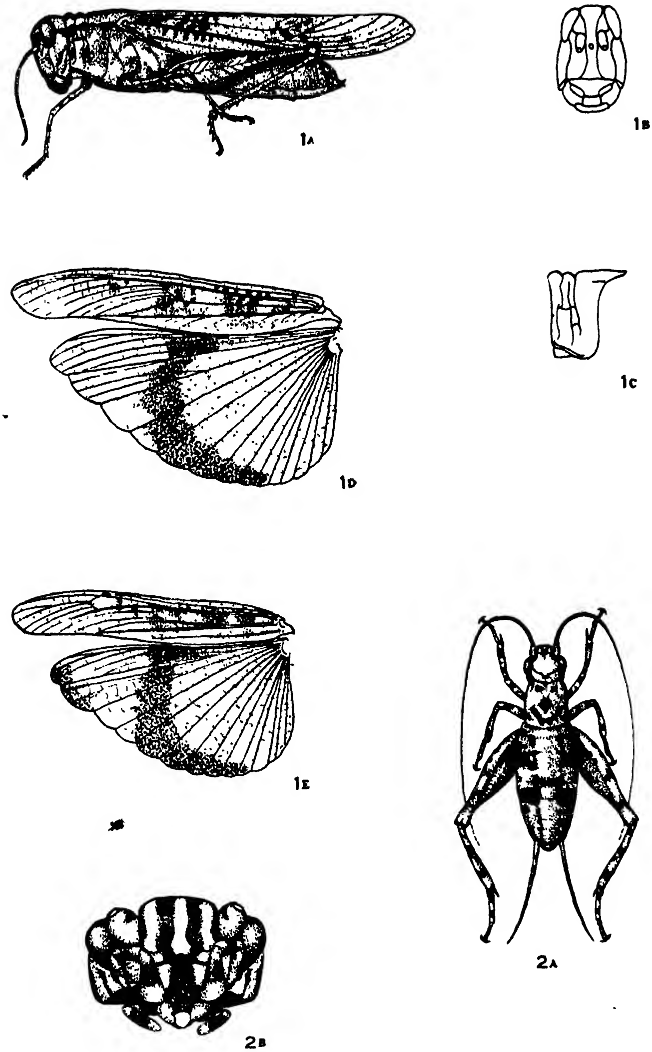
Fig. 1C. The same. Lateral outline of pronotum. (X2).

Fig. 1D. The same. Figure of tegmen and wing. (X1½).

Fig. 1E. *Trimerotropis acta* new species. Miami Beach, Fla. Male (*allotype*). Figure of tegmen and wing. (X1½.)

Fig. 2A. *Oligacanthopus prograptus* Rehn and Hebard. Miami, Fla. Male (*allotype*). Dorsal view. (X4.)

Fig. 2B. The same. Head, cephalic aspect. (Greatly enlarged).



MIAMI, FLORIDA, ORTHOPTERA—HEBARD.

Notes on Bombidae, with Descriptions of New Forms (Hym.).

By HENRY J. FRANKLIN, Massachusetts Agricultural College, Amherst, Mass.

In this paper, I present descriptions of the new American forms of *Bombus* and *Psithyrus*, of which I have seen representatives and also the new records of distribution which I have accumulated since the appearance of my monograph of the Bombidae of the New World. (Trans. Amer. Ent. Soc. xxxix, 1913).

Bombus (Bombus) alboniger new species.

Types: The queen and male described below came from Cerro Zunil, Guatemala (4,000 to 5,000 ft. alt.), having been collected by G. C. Champion. The worker type came from Irazu, Costa Rica (6,000 to 7,000 ft. alt.—H. Rogers, collector). All these specimens, together with a queen paratype from Cerro Zunil, are deposited in the collection of the British Museum.

Pile of medium length and rather fine. Head mostly dark. Sides of thorax white; its dorsum, except the scutellum, mostly black. Abdomen with the first dorsal segment and the middle of the second white, otherwise entirely black.

Queen. Head.—Face entirely dark; occiput black, but with a faint admixture of very fine pale yellow hairs; cheeks entirely dark. Malar space somewhat shorter than its width at apex, about one-fifth as long as the eye. Clypeus rather sparsely punctate over the disc with rather coarse punctures.

Thorax.—Dorsum mostly black, but with a very noticeable triangular spot of yellow pile just back of the head and with the hind margin of the scutellum clothed heavily with white pile. Mesopleura from the bases of the wings to the bases of the legs, metapleura and sides of median segment clothed with white pile.

Abdomen.—Dorsum: Segment one clothed with pure white pile; segment two black on the sides, but with a wide patch of white pile running across its middle part (this patch being widest—more than two-thirds of the entire width of the abdomen at that place—at the front margin of the segment and growing rapidly narrower until it reaches the hind margin—where it is about one-third as wide as the segment); segments three to six inclusive entirely black. Venter dark.

Wings.—Only moderately infuscate; about like those of the ***ephippiatus*** queen; the fore pair lightest across their middle portions.

Legs.—The trochanters mostly dark, but with a slight sprinkling of light hairs on their lower sides; the femora black, but with a few pale hairs at their very bases on the lower side; corbicular fringes black.

Worker.—Much like the queen, but with lighter, subhyaline wings; the triangular spot of light pile on the dorsum of the thorax just back of the head white instead of yellow.

Male. Head.—Face well clothed with gray pile (a mixture of long black hairs and shorter white ones); occiput with much whitish pile in the middle but with only black hair on the sides; upper part of cheeks entirely dark, but their lower part with much light pile. Mandibles with a heavy ferruginous beard. Length of malar space and its width at apex about equal. Clypeus well covered with pile.

Thorax.—Coloration of pile much like that of worker, but the clothing of the scutellum mostly white and a line of white pile running across the dorsum at its front margin.

Abdomen.—Coloration of dorsum like that of worker. Apical margins of the ventral segments fringed with light hairs.

Legs.—Coxae and trochanters densely fringed with white pile on their lower sides; femora entirely dark except for a few pale hairs at their very bases; hind tibiae with long ferruginous fringes (hairs) and with their outer faces sparsely hairy.

Dimensions.—Length: queen, 19 mm.; worker, 11 mm.; male, 12 mm. Spread of wings: queen, 39 mm.; worker, 25 mm.; male, 26 mm.

This species belongs to the *pratorum* group (I have examined the tips of the genitalia, which are slightly extruded in the type specimen) and seems to be closely related to *pulcher* Cress. The appearance of this species is very striking, its black and white pile contrasting sharply.

Bombus nigrodorsalis Franklin.

Five queens and two workers of this species, which were sent to me for determination by G. Meade-Waldo, of the British Museum, show sufficient evidence by their marked variation in coloration to justify the conclusion that *nigrodorsalis* Franklin and *montezumae* Ckll. are color variants of the same species rather than distinct species. The name *nigrodorsalis* has priority.

These specimens provide the following new habitat records for the species: Ciudad, Mexico, 8,100 ft. (2 queens, Forrer coll.); Omilteme, Guerrero, Mexico, 8,000 ft. (1 queen, H. H. Smith coll.); Xucumanatlan, Guerrero, Mexico, 7,000 ft. (1

queen, H. H. Smith coll.); Quezaltenango, Guatemala, 7,000 ft. (2 workers, G. C. Champion coll.).

The malar space of the females of this species is only a little more than one-fourth as long as the eye, and that of the male is fully a fourth as long as the eye. The third antennal segment of the male is only a little longer than the fourth. The male before me has the fourth dorsal abdominal segment entirely dark except for a faint fringe of very short pale hairs along its apical margin, the fifth segment dark except for a strong fringe of ferruginous hairs along its apical margin, and the sixth and seventh segments with mostly ferruginous pile.

Bombus trinominatus D. T.

There are three queens of this species from the collection of the British Museum before me, all from Omilteme, Guerrero, Mexico, 8,000 ft. alt. (H. H. Smith).

These specimens are from 17 mm. to 18 mm. in length. They have the apical margin of the fifth dorsal abdominal segment fringed with ferruginous pile and the clothing of the sixth dorsal segment is mostly of the same color. This fringe of the fifth segment and clothing of the sixth are, without doubt, normally ferruginous, instead of yellow as they have previously been described. The apical margins of the four middle ventral segments are fringed for the most part with pale hairs.

Bombus brachycephalus Handl.

There are four queens of this species from the collection of the British Museum before me. Two of these specimens (from Omilteme, Guerrero, Mexico, 8,000 ft. alt.), are typical in their characters, and, as the description of the females of this species given in my monograph. (Trans. Amer. Ent. Soc. xxxix, 1913, p. 143) is meagre. I will describe the queen more in detail here:

Queen. Head.—Face mostly black, but the frons with a general, though inconspicuous, admixture of short stramineous pubescence. Occiput and cheeks entirely dark. Malar space distinctly shorter than its width at apex, slightly more than one-sixth as long as the eye. Clypeus moderately and coarsely punctate. Ocelli large and placed considerably below the supra-orbital line, almost exactly in the narrowest part of the vertex, the lateral ones being much nearer to the margins of the eyes than to each other. Flagellum of antenna about one and two-thirds times as long as the scape.

Thorax.—Entirely black. A large area around the center of the dorsum naked, smooth and shining.

Abdomen.—The three basal segments of the dorsum entirely black and the three apical ones clothed with ferruginous pile. Venter black except for the ferruginous hair fringing the apical margin of the fifth segment and clothing the sixth.

Wings.—Very dark, with violaceous reflections.

Legs.—Coxae, trochanters, femora, fore and middle tibiae and corbicular fringes (hairs) all black.

Dimensions.—Length, 18 mm. to 19 mm.; spread of wings, 45 mm. to 46 mm.

The other two queens before me show a marked variation from the typical form, and I here establish two color variants on the characters shown by them:

Color Variant 1.—Like the typical queen, but with the fourth dorsal abdominal segment clothed entirely with black pile, the fifth dorsal segment with considerable black hair on its middle portion, especially toward the base, and the clothing of the epipygium black except on the extreme sides.

Queen from El Jicaro, Vera Pás, Guatemala (Champion).

Color Variant 2.—Like the typical queen, but with the fourth dorsal abdominal segment clothed entirely with black pile, the fifth segment entirely dark except for a touch of light ferruginous hair on each hind corner, the epipygium entirely dark except for a few scattering ferruginous hairs on the sides, the fifth ventral segment with no apical fringe of ferruginous hairs, and the hypopygium without ferruginous clothing except at its very apex.

Queen from San Geronimo, Guatemala (Champion).

Bombus (Bombias) weisi Friese.

A male before me, collected by C. H. T. Townsend at Huascaray, Peru (6,500 ft.), because of its structural characters, its form and the character of its pile, seems to me to represent a male color variant of this species. It differs strikingly from the typical male described by me in "The Bombidae of the New World," in the following respects:

General color much darker; occiput of head with mostly black pile; face with much black hair admixed, especially around and above the bases of the antennae; dorsum of thorax with a very broad black band between the bases of the wings, a narrow band of yellow running across the front and the scutellum bearing a considerable hind border of yellow hair; pleura and sides of median segment with entirely dark pile; second dorsal abdominal segment with entirely dark pile; a few scattering white hairs present on the sixth and seventh dorsal segments; the legs with no yellow pile; the wings rather dark.

I received this specimen through the kindness of Prof. T. D. A. Cockerell.

Psithyrus intrudens (F. Sm.) Handl.

A female of this species from the collection of the British Museum is before me. It bears two locality labels—"Santa Cruz" and "San Geronimo, Guatemala (Champion)." This species is much like *laboriosus* in general appearance, the only noticeable difference between it and the specimens of that species without any yellow on the dorsum of the abdomen being the shaded lower portions of its pleura and the greater amount of yellow in the pile of the frons above the bases of its antennae. It can be readily separated from *laboriosus* structurally, however, by its much finer pile and by the much finer and sparser punctuation of the dorsum of its abdomen, the abdomen being scantily clothed and shining much like that of *variabilis*.

Psithyrus bicolor Franklin.

A specimen before me, from Xucumanatlan, Guerrero, Mexico (7,000 ft. alt.), seems much like the type of this species, except that the disc of the dorsum of its thorax is not noticeably darkened, its second dorsal abdominal segment has no yellow pile whatever on its hind corners, the yellow on the hind corners of its third segment does not extend toward the middle line along the hind margin and its fourth segment has no yellow pile whatever in the middle. The punctuation of the dorsum of its abdomen is about like that of *intrudens*, being much finer and sparser than that of *insularis*. This specimen may represent a new species, but I prefer not to give it a new name until I know more about the variations of the Mexican and Central American *Psithyri*.

I have the following new habitat records for New World species of *Bombus* and *Psithyrus*:

1. **Bombus terricola** Kirby. Fargo, No. Dakota, forty-two specimens, representing all three castes; Detroit, Minnesota, three workers; Lake Park, Minnesota, four males and one worker (all by O. A. Stevens).
2. **Bombus affinis** Cresson. Fargo, No. Dakota, one worker (O. A. Stevens).

3. **Bombus borealis** Kirby. Fargo, No. Dakota, one queen, one worker and four males; Detroit, Minnesota, one queen; Moorhead, Minnesota, one queen (all by O. A. Stevens).
4. **Bombus impatiens** Cresson. Lake Park, Minnesota, two workers (O. A. Stevens).
5. **Bombus ternarius** Say. Fargo, No. Dakota, twenty specimens, representing all three castes; Medora, No. Dakota, one queen; Lake Park, Minnesota, one worker and four males (all by O. A. Stevens).
6. **Bombus huntii** Greene. Sentinel Buttes, No. Dakota, one qeeen (O. A. Stevens).
7. **Bombus perplexus** Cresson. Fargo, No. Dakota, one queen (O. A. Stevens).
8. **Bombus californicus** Smith. Beaver Creek, Montana, 6300 ft. alt., two workers (S. J. Hunter).
9. **Bombus pennsylvanicus** Geer. Fargo, No. Dakota, one queen and three workers (O. A. Stevens); Jalisco, Mexico, one male (Schumann).
10. **Bombus sonorus** Say. A queen without label, said, apparently on good authority, to have been collected in Sonoma County, California. Northern Sonora, Mexico, one queen and two workers (Morrison).
11. **Bombus nevadensis** Cresson. Dickinson, No. Dakota, one queen and one worker (O. A. Stevens).
12. **Bombus rufocinctus** Cresson. Fargo, No. Dakota, two workers and two males; Detroit, Minnesota, two queens (all by O. A. Stevens).
13. **Bombus ephippiatus** Say. Purula, Guatemala, one worker and one male; V[olcan] de Chiriqui, 2,000 to 3,000 ft. alt., two workers (Champion). Rio Sarstoon, British Honduras, one worker.
14. **Bombus pulcher** Cresson. Xucumanatlan, Guerrero, Mexico, 7,000 ft. alt., one worker (H. H. Smith). Orizaba, Mexico, one queen and four workers (H. H. S. and F. D. G.). Santa Cruz, Guatemala, one queen; San Geronimo, Guatemala, one queen; Capetillo, Guatemala, one queen (Champion). Ciudad, Mexico, 8,100 ft. alt., one queen (Forrer). Omilteme, Guerrero. Mexico, 8,000 ft. alt., two workers.
15. **Bombus wilmattae** Cockerell. Quezaltenango, Guatemala, 7,800 ft. alt., two workers and one male (Champion).
16. **Bombus emiliae** Dalla Torre. Ocampo, Argentina, two workers.
17. **Bombus steindachneri** Handlirsch. Chilpancingo, Guerrero, Mexico, 4,600 ft. alt., one queen and one worker; Amula,

Guerrero, Mexico, 6,000 ft. alt., one queen and one worker; Acaguizotla, Guerrero, Mexico, 3,500 ft. alt., two workers and one male; Tepetlapa, Guerrero, Mexico, 3,000 ft. alt., one worker (all by H. H. Smith). Jalisco, San Blas, Mexico, two workers; Tepic, Mexico, one worker (all by Schumann). Ventanas, Mexico, 2,000 ft. alt., one worker (Forrer).

18. **Bombus dolichocephalus** Handlirsch. Amula, Guerrero, Mexico. 6,000 ft. alt., one queen; Xucumanatlan, Guerrero, Mexico. 7,000 ft. alt., one worker; Acaguizotla, Guerrero, Mexico, 3,500 ft. alt., one worker (all by H. H. Smith). Tepic, Mexico. one queen; Jalisco, Mexico, one queen (both by Schumann).

19. **Bombus niger** Franklin. Monte Alegre, Lower Amazon, Brazil, one worker (E. E. Austen). Bugaba, Panama, two workers (Champion).

20. **Bombus medius** Cresson. Para, Brazil, one queen (E. E. Austen). Valladolid, Yucatan, Mexico, one worker (Gaumer). Jalapa, Mexico, one worker (F. D. G.). Teapa, Tabasco, Mexico, one queen (H. H. Smith). San Geronimo, Guatemala, one worker and one male; Bugaba, Panama, 800 to 1,500 ft. alt., one male (all by Champion).

21. **Bombus mexicanus** Cresson. Guatemala City, Guatemala, one worker (W. P. Cockerell).

22. **Bombus volucelloides** Gribodo. Rio Sucio, Costa Rica, one queen (H. Rogers). Omilteme, Guerrero, Mexico, 8,000 ft. alt., one worker (H. H. Smith).

23. **Bombus funebris** Smith. Pachacayo, Peru, over 12,000 ft. alt., one male (C. H. T. Townsend).

24. **Bombus coccineus** Friese. Pachacayo, Peru, over 12,000 ft. alt., one worker (C. H. T. Townsend).

25. **Psithyrus laboriosus** (Fabricius) D. T. Fargo, No. Dakota, two males; Kathryn, No. Dakota, one female: Lake Park, Minnesota, one male (all by O. A. Stevens).

26. **Psithyrus insularis** Smith. With the new evidence produced by Sladen (Can. Ent. xlvii, 1915, page 84) in mind, I now regard *consultus* as being the male of this species without question. Fargo, No. Dakota, two males (O. A. Stevens).

27. **Psithyrus variabilis** (Cresson) D. T. Orizaba, Mexico, one male (H. H. S. and F. D. G.). Fargo, No. Dakota, one male (O. A. Stevens).

28. **Psithyrus ashtoni** (Cresson) D. T. Fargo, No. Dakota, one female and three males; Lake Park, Minnesota, three males (all by O. A. Stevens). New Jersey, two females (G. C. Crampton).

29. **Psithyrus latitarsus** Morrill. Creede, Colorado, 8,844 ft. alt., one female (S. J. Hunter).
30. **Psithyrus suckleyi** (Greene). Creede, Colorado, 8,844 ft. alt., three males (S. J. Hunter).

The following differences, in addition to those given in my monograph of the Bombidae, should be noted as distinguishing the females of the three American groups of *Psithyrus*:

1. *The Laboriosus Group.* Females with the sides of the fifth dorsal abdominal segment moderately punctate and its middle portion either impunctate or sparsely or moderately punctate; the middle portion of the exposed part of the sixth dorsal segment more or less punctate.

2. *The Ashtoni Group.* Females with sides of fifth dorsal segment very densely punctate, the dense punctuation extending nearly to the middle line on the hind part of the segment a little in front of the apical margin; the middle part of the exposed portion of the sixth dorsal segment only sparsely punctate at most.

3. *The Fernaldae Group.* Females with fifth dorsal segment impunctate in the middle, except for a few punctures in front of the apical margin, and sparsely to moderately punctate on the extreme sides; the middle part of the exposed portion of the sixth dorsal segment practically impunctate.

In a collection of bumblebees recently received from Mr. A. S. Skorikov, of Petrograd, Russia, and named by him, I find the following interesting records of capture at high altitudes: *Bombus morawitzi* Rad., ☿, Pamir, Turkestan, 15,000 ft.; *Bombus regeli* F. Mor., ♂, Bucharei, Turkestan, 12,500-13,000 ft. I also find that the following species represented in this collection belong to the sub-genus *Bombias*: *regeli* F. Mor., *niveatus* Kriechb., *incertus* F. Mor. The females of *niveatus, incertus* and *apollineus* Skor. present the most remarkable case of a parallel development in coloration of species not at all closely allied, with which I am familiar, their coloring, especially that of the first two species, being almost exactly alike. They can be readily separated structurally, however. The female *niveatus* has a long malar space (much longer than its width at the apex—a remarkable character for *Bombias*), and its ocelli are large and placed considerably below the supraorbital line, in the narrowest part of the vertex. The female *incertus* has a short malar space (slightly shorter than its

width at apex), and its ocelli are large, but placed not far below the supra-orbital line. The female *apollineus* has a short malar space (about like that of *incertus*), but its ocelli are small, and the sides of its head behind the eyes are much more densely punctate than those of *incertus*.

The eyes of the *niveatus* male are considerably swollen, and its ocelli are placed at somewhat less than one-third of the distance from the supra-orbital line toward the bases of the antennae, being slightly above the narrowest part of the vertex. Each of its lateral ocelli is a little less than its own diameter from the nearest eye-margin. The size and relative position of the eyes and ocelli of the male of *regeli* are about the same as with the *niveatus* male.

The Occurrence of Striking Peculiarities of Pattern in Unrelated Chalcidoid Hymenoptera.

By A. A. Girault, Washington, D. C.

In North Queensland I chanced upon the following examples of the occurrence of striking and peculiar color patterns in unrelated Hymenoptera of the Chalcidoid series. There is a number of very beautiful chalcid flies which have the head and thorax metallic green or purple and the abdomen deep golden yellow, margined down all, or part, of each side by the metallic color. The peculiarity and unusualness of this kind of pattern is such as to catch the eye at once and the first species which I encountered was subsequently thought to be very common from the fact that the pattern was taken as the index of identity. However, later, these specimens were closely examined and resulted as follows:

A pirene miscogasterid, a eupelmid, an encyrtid, an aphelinine (*Encarsia*) and several other Eulophidae representing two undescribed tetrastichine genera (two species in one of them), an *Aprostocetus*, an *Ootetrastichus* and a *Tetrastichus*. Here we find represented three families of the series, five subfamilies, nine genera and ten species. The habits of none of

these are known, but at least one must be a coccid parasite, and it is hardly likely that any of the species are associated or that the coloration has any significance from the standpoint of mimicry, or what may be called protective association. Most of these species are forest insects, but at least a third appear to be peculiar to jungle country. They were all captured at varying times and places (mostly near Nelson), and one of the tetrastichines was reared from a gall on a typical forest tree. These are, therefore, prominent examples of what may be called analogical likenesses or the development of similar characters among diverging lines of evolution.

Among the Mymaridae a *Gonatocerus* with banded wings is indeed a rarity or peculiarity more especially when the band takes the longitudinal rather than the transverse direction. There occur in North Queensland several large species of odd habitus as concerns the genus, two of which are very much alike and bear in the forewing a conspicuous longitudinal stripe; these two species are rather commonly met with in the jungle, but one day while sweeping in a jungle pocket at Meerawa I caught what I thought was another specimen of one of them and consequently was not particularly interested until upon examining the collection later I was surprised beyond the ordinary to find that the specimen was a *Polynema*. These three species belong to the jungle and the *Polynema* is as peculiar to its own genus as the other two are to theirs. Species of *Polynema* from the jungle quite frequently bear transverse stripes on the forewings, some of them very broad and conspicuous, in this case really and truly remarkable and wonderfully beautiful insects, but I have never seen a second member of the genus with a longitudinal stripe.

This occurrence of striking patterns of color in unrelated insects seems to be due merely to what may be expressed as chance variations, being preserved because they do not disturb the economy of the insects in question, and not to any significant mimetic or other interrelations between the species. I see no reason why this is not the explanation. The variation occurs and is preserved.

Another Migratory Moth (Lep.).

By J. R. WATSON, Florida Agricultural Experiment Station, Gainesville, Florida.

During the past year the writer has been working on the life history and distribution of the noctuid moth *Anticarsia gammatilis*. This study has resulted in some rather interesting discoveries. The caterpillars are a great pest of one of our most valuable leguminous forage and soil-improving plants, the velvet bean (*Stizolobium* sp.). It attacks also the kudzu vine and the horse bean (*Cannavalia*).

Neither the caterpillars or the moths make their appearance about Gainesville until August, and usually do not become sufficiently abundant to cause material damage until the first of September, although the velvet beans are large enough to seem to be attractive as early as May. Hence one of the questions that we set out to solve was, Where are the insects from early December until August? There seemed to be three possible answers. Stated in the order of their seeming probability, they were:

(1) The caterpillars and moths are present during at least the spring and early summer but in such diminished numbers as to escape attention; the caterpillars perhaps feeding on some wild legume.

(2) The insect remains in the pupa stage until late July or August.

(3) The insect dies out each winter to again come up from the south each summer.

1. A careful search has been made during the past two seasons for both the moths and the caterpillars during the first seven months of the year. The fields and woods have been carefully searched every few days and moth traps maintained at night. This search has yielded uniformly negative results. Not a single moth or caterpillar has been seen before August.

2. Hundreds of caterpillars were reared in the laboratory during October and November with special care to protect them from "cholera," a fungus disease due to *Botrytis rileyi*. These pupae and others collected from the field were placed in

an outdoor insectary under as nearly natural conditions as possible. The last moth to emerge from these pupae came out early in January. All that remained after that date failed to emerge at all, and investigation a little later showed that they were all dead. Careful search through the velvet bean fields in January failed to discover any live pupae. The last moths to be seen on the wing out of doors were flying late in December.

3. There seemed to be left only the third possibility. This led to an investigation of the insect's distribution and dates of appearance in other localities. There was little found on this subject in literature. Holland in "The Moth Book" gives the distribution as the "Mississippi Valley." Dyar in his list gives it as "Atlantic States." Over fifty circular letters were sent out to students of lepidoptera in the eastern United States, most of whom replied. To sum up the answers we get the following results: No one north of the Gulf States had seen the larvae. The moths have been taken as far north as Ontario, but, with one exception, all of these moths captured in the North were taken from late September to November.

I could find no record of the capture of the moth in the New England States. In the Northern States it seems to be most frequently taken in western Pennsylvania and Ohio, *i. e.*, directly north of Florida. All the available evidence seems to indicate that *Anticarsia gemmatilis* is a mere wanderer in the Northern States like *Alabama argillacea.*

Velvet beans in the western part of Florida are not greatly troubled, and both Prof. Worsham in Georgia and Dr. Hinds in Alabama inform me that they have never noticed the caterpillars.

Turning next to south Florida, we find quite a different condition of affairs. The insect begins to do serious damage to velvet beans in the Miami section in July, at least six weeks earlier than at Gainesville. On June 30, 1915, the writer found the moths to be present in the fields at Winter Haven in Polk County, 28° N. The moths were all badly rubbed, indicating that they were old. They were not at all abundant. No larvae were seen nor was there any indications of their work on vel-

vet beans. The moths had evidently just arrived. An equally careful search at Tavares in Lake County (a little below the 29th parallel) the next day gave entirely negative results, as did a very careful search at Gainesville (about 29 deg. 40 min.) on July 2.

The following data from the manuscript of Mr. Grossbeck were supplied to me by Mr. Frank E. Watson, of the American Museum of Natural History: "The moth was taken at South Bay, Lake Okeechobee, on April 29 and 30. Extends northward to Staten Island, westward to Wisconsin and Texas and so southward through Mexico and the Antilles to South America."

It does not seem, however, to be generally abundant in the West Indies. Several correspondents in Porto Rico report that it is not troublesome there or that they have never noticed it, but it is reported to be common in Cuba.

It seems therefore quite certain that the insect does not ordinarily winter over even in the central part of Florida, but works northward each summer from south Florida where one or more of its host plants are available for food at all seasons. It seems to be a sub-tropical insect ill adapted to regions of frost. There grows in south Florida a wild species of *Cannavalia* that could well be its original host plant as well as that of another species of the same genus, *A. ferruginea* Sm. Neither the velvet bean nor kudzu are native to Florida. We have here then a case of a native insect becoming a pest to an introduced plant.

With us, however, it is not the direct action of the cold that exterminates the insect. On November 21, 1914, the thermometer on the station grounds sank to 22° which is considerably lower than that usually recorded at any time during the average winter. Yet pupae lying exposed on the surface of the ground were not injured, and a number of moths were captured in the field, a few days later when the weather had moderated. The factor which prevents their enduring even the mild winter of the latitude of Gainesville is their imperfect hibernation. A few warm days in winter causes the moths

to emerge from the pupae, while the absence of food plants results in their death without progeny. If the insects could remain as pupae until April or even late March, they would, in many cases, find suitable host plants before death.

After the freeze of November 21 which killed their observed host plants, attempts were made to raise the caterpillars on some of the wild and cultivated legumes from the fields and woods. Although the caterpillars ate sparingly of some of these plants, alfalfa being one of the least disliked, they would not grow, and undoubtedly all would have died had not some velvet beans been raised in the greenhouse for them.

Their ability to reach such far northern stations as Canada is to be explained by their longevity. Some moths kept in a cage 4 x 4 x 5 feet and fed on moistened sugar lived for five weeks.

A detailed description of the larvae, their work, and the life history of the insect will be published in the next annual report of this station. Only a brief summary can be given here. In September the insect spends about three days in the egg stage and twenty-one in the larval, passing through six instars. The pupal stage averages between ten and eleven days in September. As the weather became cooler with the advance of the season, this time was gradually lengthened until those that pupated in November averaged twenty-one days, and two that pupated on November 20th and 21st issued on January 7th, forty-eight and forty-seven days, respectively.

The writer will be grateful for any additional records of the occurrence of this moth or its caterpillar.

Completion of the "Biologia Centrali-Americana."

The [London] *Times Literary Supplement*, of September 16, 1915, announces the appearance of the Introductory Volume of this work by Dr. F. D. Godman, saying: "The Introductory Volume, by the surviving editor, marks the completion of this monumental work on the natural history and archaeology of one of the most interesting areas on the earth's surface. The manifold departments have required for their investigation the labours of a whole army of the most eminent specialists, producing gradually in the course of 36 years 52 volumes of zoology, five of botany, and six of archaeology." We hope to present a more extended notice of the Introduction at a later date.

ENTOMOLOGICAL NEWS.

PHILADLPHIA, PA., NOVEMBER, 1915.

Jean Henri Fabre.

A telegram from Orange, France, dated October 11, 1915, published in the daily press, reads, "Henri Fabre, the entomologist, is dead."

What a life was his since first he saw the light at Saint-Léons, canton of Vezins, in the Haut Rouergue, on December 22, 1823! He himself wrote of it—

> a life...not exempt from many cares, yet not very fruitful in incidents or great vicissitudes, since it has been passed very largely, in especial during the last thirty years, in the most absolute retirement and the completest silence.

Most absolute retirement and completest silence account for much of his career. His positive dislike of most human society and intercourse, his infrequent letters even to his well-loved brother, his refusal to observe many of the ordinary conventionalities had much to do with the obscurity in which most of his life was spent. They explain why he remained for nearly twenty years (1853-1871) assistant professor of physics at the Lycée of Avignon without change in rank, title, or salary, the last amounting to £64 per annum. Fortunately, other sources of income became available, such as that derived from the conservatorship of the Requien Museum.

It was during the Avignon period that his entomological researches began with the *Étude sur l'instinct et les metamorphoses des Sphégiens* (1856), but the first series of the *Souvenirs Entomologiques* did not appear until 1879. Nine others followed, the tenth in 1908. An English translation of the first series, entitled *Insect Life Souvenirs of a Naturalist,* was published in 1901 and selections from the others have been included in *The Life of the Spider, Social Life in the Insect World, The Mason Bees,* etc. Nothing more fascinating in all entomological literature, and at the same time free from all technicality, can be found than Fabre, even though he has been

accused of "making deductions too rapidly from his observations and taking a philosophical position from which he refuses to budge." His biographer insinuates that he was as disregardful of much of the work of others in his chosen field as he was of humans in general.

When at last his genius was generally recognized at home as well as abroad, a jubilee held in his honor at Serignan, in April, 1910, and leaders in literature and science acclaimed his greatness, he was well over eighty. Yet in spite of the neglect, the poverty, the sorrows of a long life, Fabre could write from his Serignan hermitage, as he approached his eighty-eighth birthday—

> on reading now the old letters which he [my devoted disciple] has exhumed from a mass of old yellow papers......it seems to me that in the depths of my being I can still feel rising in me all the fever of my early years, all the enthusiasm of long ago, and that I should still be no less ardent a worker were not the weakness of my eyes and the failure of my strength an insurmountable obstacle.

These words form part of the preface which he contributed to that appreciative volume *Fabre, Poet of Science*, by Dr. C. V. Legros, published in English dress in 1913.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Some Rare California Butterflies (Lep.).

In the latter part of April, 1914, Mr. H. H. Newcomb and I made an automobile trip from Los Angeles through Elizabeth Lake and Mojave to Johannesburg in the Mojave Desert country. We saw but few butterflies in Bouquet Canyon, but at Elizabeth Lake, about forty miles south from Tehachapi and at a 3000 foot elevation, we caught a large number of *L. chlorina*. This is like *L. acmon*, but of a decided greenish blue color and quite different from the blue of *acmon*. Also, it is not at all like Clemence's *L. monticola* from the Mt. Wilson region, which is a lighter blue than *acmon*. A few of *M. gabbi* were taken here.

Passing into Antelope Valley, which is the western end of the Mojave Desert, at about 2200 feet elevation, we immediately commenced to get another form of *Melitaea* named *neumoegeni* by Dr. Skinner. A range of hills marked the line of demarcation betwen the two forms.

About twelve miles east of Mojave, on the line of the Southern Pacific Railway, we ran into a country covered with greasewood. The

open spaces were covered with myriad flowers and clumps of bunchgrass. Here we found Henry Edward's *L. speciosa* in abundance. This beautiful little insect is intensely blue with a broad black border and white fringe and with the under side marked like *L. polyphemus,* the spots being very large and heavy. The female has very little blue and looks almost black at first glance. I judge it to be a dwarfed, desert form of *L. polyphemus,* hardly larger than *exilis,* with the coloring and spots very strongly marked. They flew close to the ground and were occasionally taken clinging to the stems of bunchgrass. With their wings folded tight and the under side only showing, they were very much the same color as the grass, which was already bleaching under the desert sun.

At Johannesburg we took a few *L. speciosa,* a number *of M. neumoegeni,* several dwarfed desert specimens of *E. ausonides* and each of us took one *E. cethura,* form *morrisoni* (or perhaps W. G. Wright's form *deserti*). We also saw the tail end of an enormous flight of *P. cardui,* which covered all of Los Angeles County in February and March.

Altogether we had a very interesting trip through a fascinating and little traveled country. Generally one sees a number of coyotes and jack rabbits on this trip, but we saw none. We did, however, capture several desert tortoises, three rattlesnakes and a number of horned toads.—J. R. HASKIN, Los Angeles, California.

Cicindela unipunctata Fabr. at Seaville, New Jersey. (Col.).

Twenty-one specimens of this tiger-beetle were taken along a road at Seaville on August 12 and 16, 1915. The road was well shaded by pine and oak trees and exhibited several kinds of soil. The majority of the specimens were taken on dark, rich-looking earth, which occurs along the coast back of the marshes, but does not penetrate far into the State. At one time, when the road was more used, gravel was filled in along one stretch, and several specimens were taken here. In another place a narrow stretch of white sand occurred in an otherwise uninterrupted area of the black earth before mentioned and two specimens (in copulation) were taken on this. But very few of the whole number were taken on white sand. In my search I went back several miles inland and here the typical heavy Jersey sand began and *unipunctata* ceased. All the specimens were taken within two miles of the beginning of the road.

On the first date, August 12th, eleven specimens were taken. This was a bright, sunny morning and the sun's rays penetrated through the foliage overhead and struck the road in places, but *unipunctata* was never in these light places. On this occasion everyone of the eleven specimens was absolutely motionless when taken. Many of them showed no life until after they were put in the bottle. They were usually in or near the centre of the road, in the characteristic tiger-beetle

position, head somewhat higher than the body. They frequently resembled very closely the background of dead twigs and leaves and showed no more signs of life. Along the edges of the road in some places was a slight bank, and in this bank were often circular, irregular holes ranging from the size of a quarter to a half dollar. None of the specimens were taken near these holes, however.

On the second date, August 16th, the remaining ten specimens were taken in the afternoon. This time the day was rather cloudy, and several of the specimens were taken around five o'clock, when the road was considerably darker than on the previous occasion. These specimens were quite lively, running rapidly when approached, but never flying.

The rest of the insect life of this locality seemed to be limited mostly to *Cicindela punctulata* in large numbers, a few specimens of *C. consantanea* and wasps of the families Sphecidae and Mutillidae.—Wm. C. Thompson, Philadelphia, Pa.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

3—The American Naturalist. **4**—The Canadian Entomologist. **5**—Psyche. **6**—Journal, New York Entomological Society. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **10**—Nature, London. **21**—The Entomologist's Record, London. **36**—Transactions, Entomological Society of London. **38**—Wiener Entomologische Zeitung. **40**—Societas Entomologica, Zurich. **47**—The Zoologist, London. **50**—Proceedings, U. S. National Museum. **60**—Anales, Museo Nacional de Buenos Aires. **68**—Science, New York. **79**—La Nature, Paris. **84**—Entomologische Rundschau. **87**—Bulletin, Societe Entomologique de France, Paris. **143**—Ohio Naturalist. **148**—New York Agricultural Experiment Station, Geneva. **166**—Internationale Entomologische Zeitschrift, Guben. **169**—"Redia," R. Stazione di entomologia Agraria in Firenze. **179**—Journal of Economic En-

tomology. **193**—Entomologische Blatter, Cassel. **215**—Entomologische Berichten, uitgegeven door de Nederlandsche Entomologische Vereeniging. **220**—New Jersey Agricultural Experiment Station, New Brunswick. **272**—Memorias, Real Academia de Ciencias y Artes de Barcelona. **281**—Annals of Tropical Medicine and Parasitology, University of Liverpool, Series T. M. . **285**—Nature Study Review, Ithaca, N. Y. **313**—Bulletin of Entomological Research, London. **324**—Journal of Animal Behavior, Cambridge. **344**—U. S. Department of Agriculture, Washington, D. C. **351**—Zeitschrift fur Allgemeine Physiologie, Herausgegeben von Max Verworn, Jena. **392**—The Irish Naturalist, Dublin. **410**—Journal of the Washington Academy of Sciences. **442**—Transactions of the Connecticut Academy of Arts and Sciences, New Haven. **447**—Journal of Agricultural Research, Washington. **480**—The Annals of Applied Biology. **486**—Journal of the Elisha Mitchell Scientific Society, Chapel Hill, N. C. **503**—Boletin, Sociedad Physis, Buenos Aires. **516**—Zoologische Medeleelingen, Leiden. **517**—Pennsylvania Department of Forestry, Harrisburg.

GENERAL SUBJECT. Becker, Th.—Die franzosischen entomologen und wir, **38,** xxxiv, 194-8. **Berlese, A.**—Intorno alla riproduzione ed al dimorfismo sessuale negli insetti, **169,** x, 77-112. **Brethes, J.**—Notas entomologicas, **503,** i, 583-4. **Colton, H. S.**—Another reason for saving the genus, **68,** xlii, 307-8. **Escherich, K.**—Zeitschrift fur angewandte entomologie, Band II, Heft 1. **G. H. C.**—Recent entomological research, **10,** 1915, 689-88. **Grahe, A.**—Ein praktischer sammelkasten, **166,** ix, 49. **Guercio, G. del**—Ulteriori recerche sullo stremenzimento o incappucciamento del Trifoglio, **169,** x, 235-302. **Lizer, C.**—Trois insectes parasites des plantes nouveaux pour l'Argentine et leur distribution geographique, **503,** i, 569-73. **Meissner, O.**—Kurze bemerkungen ueber einige neuere naturwissenschaftliche theorien, **40,** xxx, 36-7. **Slosson, A. T.**—A few memories, **6,** xxiii, 85-91. **Stager, R.**—Ein universalinstrument zum fang von kleintieren, **40,** xxx, 38-9.

PHYSIOLOGY AND EMBRYOLOGY. Duncan, F. N.—An attempt to produce mutations through hybridization, **3,** xlix, 575-82.

ARACHNIDA, ETC. Hirst, S.—On a widely distributed gamasid mite (Leiognathus morsitans) parasitic on the domestic fowl, **313,** vi, 55-8. **Patterson, A. J.**—A study of spiders, **285,** xi, 265-73.

Berlese, A.—Acari nuovi [5 n. sps.], **169,** x, 113-150. **Emerton, J. H.**—New spiders from New England, XI; Canadian spiders, II [8 new; 15 new], **442,** 133-44; 145-60.

NEUROPTERA, ETC. Baker, A. W.—Lice affecting the domestic fowl, **4,** 1915, 237-41. **Kennedy, C. H.**—Notes on the life history and ecology of the dragonflies of Washington and Oregon, **50,** xlix, 259-345.

Clemens, W. A.—May flies of the Siphlonurus group [1 n. gen.; 1 n. sp.], **4,** 1915, 245-60. **Corbett & Hargreaves**—Vulturops floridensis, a new member of the Psocid subfamily Vulturopinae from the U. S., **5,** xxii, 142-3. **Hood, J. D.**—A new Hoplandrothrips (Thysanoptera) from British Guiana, **4,** 1915, 241-4. **Hood & Williams**—New Thysanoptera from Florida and Louisiana [2 n. gen.; 11 n. sps.], **6,** xxiii, 121-38. **Longinos Navas, R. P.**—Neuropteros nuevos o poco conocidos, **272,** xi, No. 23, 28 pp.

ORTHOPTERA. Fulton, B. B.—The tree crickets of New York: Life history and bionomics, **148,** Tech. Bul., 42.

Davis, W. T.—List of the O. collected in northern Florida in 1914 for the Am. Museum of Nat. History, with descriptions of n. sps. [2 new], **6,** xxiii, 91-101. **Hebard, M.**—The American species of the genus Miogryllus, **6,** xxiii, 101-21.

HEMIPTERA. Berlese, A.—La distruzione della "Diaspis pentagona" amezzo della Prospaltella berlesei, **169,** x, 151-218. **Crosby & Hadley, Jr.**—The rhododendron lace-bug, Leptohyrsa explanata, **179,** viii, 409-14. **Ege, R.**—On the respiratory function of the air stores carried by some aquatic insects (Corixidae, Dytiscidae and Notonecta), **351,** xvii, 81-124. **Leonard, M. D.**—The immature stages of the black apple leaf-hopper (Idiocerus provancheri), **179,** viii, 415-19. **Phillips, W. J.**—Further studies of the embryology of Toxoptera graminum, **447,** iv, 403-4. **Teodoro, G.**—Sui tubi malpighiani dei Lecanini, **169,** x, 15-19.

Davidson, W. M.—Little-known western plant-lice, I [2 new], **179,** viii, 419-29. **Metcalf, Z. P.**—A list of Homoptera of North Carolina, **486,** xxxi, 35-60. **Osborn & Drake**—Additions and notes on the Hemiptera-Heteroptera of Ohio; Records of Guatemalan Hemiptera-Heteroptera, with descriptions of new species, **143,** xv, 501-8; 529-541. **de la Torre-Bueno, J. R.**—Nota sobre Hemipteros del Chaco de Santiago del Estero, **60,** xxvi, 157-162.

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flies, **36**, 1915, 152-76. **Frohawk, F. W.**—Hibernated examples of Vanessa antiopa, **9**, 1915, 197. **Fruhstorfer, H.**—Beitrag zur morphologie der Prepona- und Agrias-Arten, **84**, xxxii, 45-7. **Mosher, F. H.**—Food plants of the gipsy moth in America, **344**, Bul. No. 250. **Siegler & Simanton**—Life history of the codling moth in Maine, **344**, Bul. No. 252. **Van Eecke, R.**—Bijdrage tot de kennis der Nederlandsche Lycaena-soorten, **516**, i, 22-31.

Barnes & McDunnough—On the early stages of two moths, **4**, 1915, 271-6. **Crumb, S. E.**—A key to the cutworms affecting tobacco, **179**, viii, 392-6. **Dixey, F. A.**—New species and subspecies of Pierinae, **36**, 1915, 1-15. **Fassl, A. H.**—Eine neue Sphingide aus Sud-Amerika, **40**, xxx, 41-2. **Joicey & Rosenberg**—Descriptions of n. sps. of the Pierine genera Catasticta and Daptoneura, **36**, 1915, 147-51.

DIPTERA. **Bishopp, F. C.**—Fleas, **344**, Bul. 248. **Cooper & Walling**—The effect of various chemicals on blow-fly, **480**, ii, 166-82. **Coupin, H.**—La guerre aux mouches, **79**, xliii, 33-8. **Headlee, T. J.**—The mosquitoes of New Jersey and their control, **220**, Bul. 276, 135 pp. **Keilin, D.**—Les formes adaptatives des larves des Anthomyides: les Anthomyides a larves carnivores, **87**, 1914, 496-504. **Lyon, H.**—Notes on the cat flea (Ctenocephalus felis); Does the house fly hibernate as a pupa? **5**, xxii, 124-32; 140-1. **Rabaud, E.**—Note preliminaire sur le comportement de la larve d'Agromyza aeneiventris, **87**, 1915, 97-99. **Severin & Hartung**—The stimuli which cause the eggs of the leaf-ovipositing Tachinidae to hatch, **5**, xxii, 132-7. **Studhalter & Ruggles**—Insects as carriers of the chestnut blight fungus, **517**, Bul. No. 12. **Townsend, C. H. T.**—On the reproductive and host habits of Cuterebra and Dermatobia, **68**, xlii, 253-5. **Yorke & Blacklock**—Notes on the bionomics of Glossina palpalis in Sierra Leone, with special reference to its pupal habits, **281**, ix, 349-62.

Aldrich, J. M.—The deer bot-flies (genus Cephenomyia) [1 new], **6**, xxiii, 145-50. The dipterous genus Symphoromyia in North America [8 n. sps.], **50**, xlix, 113-43. **Brethes, J.**—Description d'un nouveau Syrphide: Description de six Cecidomyidae de Buenos Aires, **60**, xxvi, 97-8; 151-6. (See also under General.) **Dohanian, S. M.**—Notes on the external anatomy of Boreus brumalis, **5**, xxii, 120-3. **Enderlein, G.**—Dipterologische studien XV. Crepidohamma, eine neue Drosophilidengattung aus Brasilien, **38**, xxxiv, 185-6. **Felt, E. P.**—New gall midges [5 new], **179**, viii, 405-9. **Ludlow, C. S.**—A question of synonomy, **5**, xxii, 137-40. **Malloch, J. R.**—Flies of the genus Agromyza, related to A. virens [5 new]; Notes on the flies of the genus Pseudodina, with description of a

n. sp., **50**, xlix, 103-8; 151-2. **Osburn, R. C.**—Studies in Syrphidae—IV. Species of Eristalis new to America, with notes on others, **6**, xxiii, 136-45. **Schmitz, H.**—Over Zygomma Enderlein en Zygoneura Meigen, **215**, iv, 157-9.

COLEOPTERA. **Burgess & Collins**—The calosoma beetle (Calosoma sycophanta) in New England, **344**, Bul. No. 251. **Coad, B. R.**—Recent studies of the Mexican cotton boll weevil, **344**, Bul. No. 231. **Craighead, F. C.**—Larvae of the Prioninae, **344**, Of. Sec. Report 107. **Ege, R.**—(See under Hemiptera.) **Heikertinger, F.**—Standpflanzenforschung. Zur praxis des kaeferfanges mit dem katscher, **38**, xxxiv, 133-69. Vom spezialisieren (Entomologische tagesfragen III), **193**, xi, 130-45. **Lovell, J. H.**—A preliminary list of the Anthophilous C. of New England, **5**, xxii, 109-17. **Rabaud, E.**—Notes sommaires sur la biologie des Cassides. 1.—Mode de ponte et d'alimentation, **87**, 1915, 196-98. **Walsh, G. B.**—Observations on some of the causes determining the survival and extinction of insects, with special reference to the C., **8**, 1915, 225-32 (cont.).

Brethes, J.—(See under General.) **Carnochan, F. G.**—Two new sps. of Hister, **5**, xxii, 144-5. **Champion, G. C.**—Revision of the Mexican and Central American Telephorinae, with descriptions of new species, **36**, 1915, 16-146. **Hopkins, A. D.**—A new genus of scolytoid beetles [4 new sps.], **410**, v, 429-33. **Horn, W.**—Genera insectorum. Coleoptera. Cicindelinae. Fasc. 82c, 209-486. **Robinson, W.**—Dicerca obscura and D. lurida, **6**, xxiii, 151-2. **Schenkling, S.**—Coleopterorum catalogus. Pars 65: Oedemeridae, 82 pp. **Sharp, D.**—Studies in Helophorini, **8**, 1915, 233-38 (cont.).

HYMENOPTERA. **Chapman, T. A.**—The egg-laying of Phymatocera aterrima, **21**, 1915, 145-49. **Cuthbert, H. E.**—Bees and colour selection, **392**, 1915, 156. **Emery, C.**—Noms de sous-genres et de genres proposes pour la sous-famille des myrmicinae. Modifications a la classification de ce groupe, **87**, 1915, 189-92. **Oudemans, J. T.**—Late wespen, **215**, iv, 169-70. **Rohwer, S. A.**—Descriptions of n. sps. of H. [47 new], **50**, xlix, 205-49. **Tuck, J. G.**—Hornets' nest in the ground, **47**, 1915, 320. **Turner, C. H.**—The mating of Lasius niger, **324**, v, 337-40. **Wadsworth, J. T.**—Notes on some hymenopterous parasites bred from the pupae of Chortophila brassicae, and Acidia heraclei, **480**, ii, 158-61.

Brethes, J.—Note sur quelques Dolichoderines Argentines; Sur les formes sexuelles de deux Dolichoderines; Contribution a l'etude des Pepsis, **60**, xxvi, 93-6; 231-4; 235-360. (See also under General.) **Gahan, A. B.**—A revision of the N. A. Ichneumon flies of the subfamily Opiinae [1 n. g.; 19 n. sps.], **50**, xlix, 63-65.

Doings of Societies.

Entomological Section, Academy of Natural Sciences of Philadelphia.

Meeting of September 23, 1915. Mr. Philip Laurent, Director, presiding. Nine persons were present.

General.—Mr. Frost mentioned Bayhead, New Jersey, as a good collecting place. Mr. Hornig spoke of collecting near Alloway, New Jersey, and exhibited the collection he had made at that place while on a two weeks' vacation at the end of July.

Lepidoptera.— Dr. Skinner exhibited an aberration of *Callosamia cynthia* taken in Philadelphia. The color was a deep smoky brown, with the white markings nearly obsolete.

Diptera.– Mr. R. C. Williams said he had been told that the ordinary vacuum cleaner nozzle will frighten house flies, but if the nozzle is made of glass the apparatus becomes very effective as a method of catching flies. He said practically the same method has been used to rid trees of insects.

Hymenoptera.- Mr. Laurent stated that last March he had secured the trunk of a Norway maple containing numbers of the larvae of *Tremex columba.* The first specimens emerged on June 16, two males. From the 16th to the 23d of June, seventy males emerged, but only three females. To the 26th of June, ninety-six males emerged and ten females. From the 27th of June until the 7th of July only nine males emerged, but 22 females. From the 8th of July until the 30th of August the insects continued to emerge, but only 25 specimens made their appearance during these fifty-four days. In all, one hundred and sixty-two specimens emerged, 119 males and 43 females. He was unable to find a sign of the cast-off pupa cases and had never seen a male specimen, except in collections, in the thirty-seven years he has been collecting, and said other collectors had had the same experience. The insects could not be made to fly, although many ways were tried. When a female was dropped from the hand, from a point ten feet above ground, it would only flop to the ground. With the males it was somewhat different; when they left the hand they would sail downward like a flying squirrel, until they hit a tree trunk or some other obstruction.

Although males and females were kept in a separate cage they could not be induced to copulate and none copulated in the main cage containing the log. He had also reared from the log eleven males and five females of the parasite, *Megarhyssa lunator,* as well as a male and female of *M. greenei* Viereck. The sixteen specimens of *lunator* emerged between May 8th and 12th. He said *lunator* was not an internal parasite on *Tremex columba* but an external one, and commented on the proportion of parasites to host, 18 to 162.

Coleoptera.— Mr. G. M. Greene referred to the desirability of mounting Coleoptera to show both the upper and under side and

exhibited mounts designed for that purpose. The insects were suspended by steel wires, in a cardboard box, with glass above and below. This method shows large exotic species in an admirable manner. Mr. Laurent exhibited twenty-one specimens of *Cicindela unipunctata,* taken in two days by Mr. W. C. Thompson, at Seaville, New Jersey. —Henry Skinner, *Recorder.*

Feldman Collecting Social.

Meeting of June 16, 1915, held at the home of Frank Haimbach, 8406 Ridge Avenue, Roxborough, Philadelphia. Fifteen members and two visitors were present. President Wenzel in the chair.

General.- Mr. Hornig said he had taken a trip to Alloway, New Jersey, on May 30, expecting to get many things in this good collecting spot, as it was such a fine day, but had collected only 33 specimens; these were exhibited. Dr. Castle said he had had a delightful time on his recent Florida trip, but as there had been cold weather, frost and then rain before he reached there, collecting was poor.

Coleoptera. Dr. Skinner said he had never noticed before that the Rose Chafer *Macrodactylus subspinosus* Fabr. was injurious to anything but roses. At his place in Narberth they have done tremendous amount of damage to his cherry trees, not only eating the leaves but the fruit as well; had counted 15 on two cherries. Mr. Kaeber said he had cut from a tree (apparently dead for several years) at Upper Darby, Pennsylvania, May 23, a fresh pair of *Leptura mutabilis* Newm. which is rare about here. Also found infested sumac at same place, which had been burned over last fall. Took some of the twigs home and on May 27 a specimen of *Liopus fascicularis* Harr. emerged, and they are still emerging. He has reared same species from oak twig taken at Woodbury, New Jersey, June 1, 1906. Mr. H. A. Wenzel exhibited *Polygraphus rufipennis* Kirby and *Hypophloeus tenuis* LeC. from Cobb's Creek, Pennsylvania, June 6, collected in white pine, and stated he had found both species under the same conditions at Pocono Mountains, Pennsylvania, August 10.

Lepidoptera and Hymenoptera. Mr. Daecke stated that while at Wildwood Park, near Harrisburg, Pennsylvania, June 12, he had found a last season's cattail, which he had taken home and from which bred *Dicymolomia julianalis* Wlk. and *Ypsolophus bipunctellus* Wlsm. and a Hymenopterous parasite. Also showed a piece of mottled brown pine bark from stump at Inglenook, Pennsylvania, on which he had found a specimen of *Phaeocyma* sp., of practically the same color, an example of protective mimicry. While the army worm was so abundant last year, now its parasite, *Enicospilus purgatus* Say, is very numerous; they fly in clouds from the grass. Mr. Haimbach exhibited his collection of N. A. Crambinae, comprising 15 genera, 84 species and 556 specimens. Adjourned to the annex.—Geo. M. Greene, *Secretary.*

PROTOPARCE RUSTICA—Wood.

UPPER FIGURE—MALE, NELSON COUNTY, VA.

LOWER FIGURE—MALE, GUANTANAMO, CUBA.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

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CONTENTS:

The Cuban Variety of Protoparce rustica Fabricius (Lep.).

By WILLIAM C. WOOD, New York.

(With Plate XIX)

The multiplication of mere varietal names is usually undesirable, although in somes cases, such as *Junonia coenia* var. *negra*, or *Pieris monuste* var. *phileta*—simple color varieties—a name may be a convenience.

Local variations would, however, seem better entitled to distinctive names. This is true especially when the points of difference are constant; when they are present in all the individuals from a particular region; and, above all, when they are not found in individuals from any other locality.

For many years I have realized that specimens of *Protoparce rustica* from the island of Cuba look different from the usual type. Such perceptions are often more or less instinctive and unreasoned. Merely as an example, take the case of two other species of *Protoparce*—*pellenia* and *scutata*. They are so similar in pattern and coloring that it would be very hard to differentiate them by a written description, yet there is little difficulty in separating them once they are known.

Protoparce rustica Fabr. is found throughout the Nearctic

and Neotropical regions, approximately between the parallels of 40 N. and 40 S. Specimens from continental North and South America are all practically alike. There is no marked variation in color or in pattern. Local races from certain island regions are, however, more or less distinctly variant. In the Galapagos Islands we find *P. rustica* var. *calapagensis* Holl., and in St. Lucia, var. *harterti* Roths.

Cuban specimens differ from the typical form, chiefly in having the grey disco-marginal banded areas of the fore wings interrupted between nervures R3 and M2, the ground color of the wing extending to the margin, with a mere trace of white marking. I have so far examined sixty specimens, twelve from Cuba, and forty-eight from the United States, Mexico. Central and South America, and Jamaica. This series is not large, but the species is not subject to much individual variation. *Without exception* the specimens from Cuba are as described below and shown in the accompanying Plate XIX (lower figure), and those from all the other localities are alike; the typical form, shown in the upper figure of the Plate. (It is interesting to note that the Jamaica specimens are of the usual type.) Is it not therefore fitting that a sub-specific name be given to the Cuban race of this species?

I would propose—

Protoparce rustica cubana. Subspec. nov.

Wings, above—Forewing: the first whitish discal line is interrupted a short distance below nervure R^2. The broad brownish-white discal band becomes obsolete between R^3 and M^2, to reappear as an indefinite patch at the hind angle. The wing and body are less sprinkled with grey scales, generally, and the ground color and whitish markings contrast more strongly. The black lines are less evident than in the typical form. Hindwing—Not noticeably different.

Underside of forewing resembles typical form, except that the space between second and third discal lines is lighter than the ground-color, and on hindwing the discal lines are more curved, and nearer the margin. Both wings slightly narrower than in the typical form.

Types, one male, one female, Guantanamo, Cuba (Ramsden), Author's collection.

Paratypes, 3 males, 1 female, ibid.; 1 female, Santiago, Cuba, Author's collection. 4 males, 1 female, Cuba, Am. Mus. Nat. Hist., New York.

(No Cuban specimens in other collections seen.)

Studies on Costa Rican Odonata.

VII. The Waterfall-Dwellers: The Internal Organs of Thaumatoneura larva and the Respiration and Rectal Tracheation of Zygopterous Larvae in general.

(Continued from page 395)

By PHILIP P. CALVERT, PH.D., University of Pennsylvania, Philadelphia.

Our knowledge of the whole subject of the respiration of Zygopterous larvae is still very indefinite, and it seems worth while to summarize it such as it is.

CLASSIFICATION OF THE TRACHEAL GILLS OF ODONATE LARVAE.

Dufour (1852), grouping all the Odonate larvae known to him under the four genera, *Aeshna, Libellula, Calopterix* and *Agrion,* gave as generic characters for the first three "Branchies intérieures ou rectales," and for the last "Branchies extérieures ou *caudales* . . . et servant aussi de *nageoires.*" He added "Comme on voit, la nature et la position des branchies établissent entre le *Calopterix* et *l'Agrion* une distance anatomique énorme" (p. 72). Hagen (1853), recognizing five families, gave for Libelluliden, Gomphiden and Aeschniden "Darmkiemen," for Calopterygiden "Darm und Schwanzkiemen," for Agrioniden "Schwanzkiemen" (pp. 261-9, 311). Rousseau (1909, pp. 2, 43, 45) has accepted the same distinctions so far as "branchies" are concerned.

Roster (1885, p. 259), on the other hand, grouped *Agrion, Lestes* and *Calopteryx* as Caudobranchiati, *Anax, Libellula* and *Aeschna* as Rectobranchiati, although Dufour (1852, p. 83) had employed the same words, in the form of French adjectives, in the different sense implied by his classification quoted above. Roster's terms were synonymous, as group names, with the earlier Zygoptera and Anisoptera and were so recognized by systematic writers.*

FUNCTIONS OF THE THREE CAUDAL APPENDAGES OF ZYGOPTEROUS LARVAE.

Réaumur (1742, p. 405), who regarded these appendages as "nageoires" (fins), and Roesel von Rosenhof (1749, pp. 41 et

*E. g., de Selys-Longchamps, Ann. Soc. Ent. Belg. xxxi, pp. 75, 80, in a "Liste des Odonates d'Europe en 1887."

seq.), who termed them "Ruder-Federn" (rudder feathers), say nothing of any respiratory function for them. Without attempting to determine who was the first author to definitely describe them as gills, it is worth recalling that it was in them that Carus (1827) first discovered the circulation of the blood in insects. To these organs he applied the terms "Schwanz-blattchen," "kiemenartigen Blättchen" and "Schwanzkiemen-blättchen" (pp. 9, 14), and he figured one of them on a large scale (Taf. I, f. 4). He termed the species which he studied *Agrion puella* and although the specific identification is probably not correct, it is evident that he had before him a typical Agrionine.*

By Dufour (1852, as already quoted), and by Roster (1886, p. 242), the two functions of respiration and of locomotion were accepted without question. Roster went so far as to conclude that

> a branchial lamella is reproduced when the individual has reached such [a state] that it is not able to accomplish its development without these necessary organs and that the presence of one lamella, although compelling the insect to a forced rest, suffices to satisfy all the respiratory needs of the organism. The great variability in the dimensions of these insects can find a cause in the defective development to which a physical imperfection, such as the absence of two respiratory lamellae, gives rise (p. 245).

The observation that Agrionine larvae can live without their caudal appendages dates back at least to Roesel (1749, p. 50). Hagen (1853, p. 311), Dewitz (1890, p. 504), and Janda (1910*a*, p. 32, 1910*b*, p. 607) inferred from this survival some sort of rectal respiration.

Sharp (1895, p. 422) thought that the respiratory function of the caudal appendages "must be of an accessory nature,

*It may be mentioned here that the second species which Carus studied and figured as "eine kleine Neuropteren-Larvae," "vielleicht zu *Semblis, Sialis,* od. dergl. gehörig," was also a Zygopterous larva, as von Siebold pointed out (Archiv f. Naturgesch, VII, 1 Bd., p. 211, 1841) that it resembles the larvae of *Agrion forcipula* [= *Lestes sponsa* Hansem.] Packard's implication (1898, p. 397) that it was in the larva of *Ephemera* that Carus made his *first* observation of circulating blood is incorrect.

for the nymphs live after the removal of the processes . . . [and] the skin of these processes is harder than is usual in Insect gills." Similar views were also expressed by Heymons (1904, pp. 23, 24):

The exchange of gas during this period [youngest larval stages] is accomplished without doubt not solely through the appendages, but in a sufficient way through the entire body-surface which at first is covered with extremely delicate chitin....During the larval period there can be no doubt that the three appendages have become primarily breathing organs from the physiological standpoint. But, as earlier, the entire body-surface serves for respiration in addition to the gill-appendages and a loss of the appendages in no way leads to death of the animal.

Tillyard (1909, pp. 381-2), discussing the caudal appendages of the larva of the Australian *Diphlebia,* while admitting that "the presence of numerous branched tracheae in these gills" must mean "that *originally* they were in some way organs of respiration," points out that the loss of these gills "does not affect the respiration of the insect in any way," and doubts "whether even the wide lateral gills of *Diphlebia,* fed by two large tracheae, are of any use at present for auxiliary respiration."

RECTAL RESPIRATION. CALOPTERYGINAE.

The earliest record of observations on rectal respiration in this group appears to be that of Roesel von Rosenhof (1749, p. 43) when he says of the nymphs [of *Calopteryx*] that they draw "their air not through the mouth, but through the abdomen, and such can easily be perceived in them if they are kept in a clear glass full of water." Dufour (1852, p. 91) saw larvae of *Calopterix* "swallow through the anus the water which serves for their respiration." He described (1849, 1852, p. 87) gills in the rectum as forming three membranous folds ("raquettes") fixed by a single extremity to the inner and posterior part of the stercoral pocket in such manner as to be free and floating for two-thirds of their length. Hagen (1880*a*, p. 160) found these gills "genau wie Léon Dufour." This statement was called forth by Olga Poletaïew's denial (1880, p. 450) of the existence of rectal gills in the larva of *Calopteryx*

based on an examination of the interior envelope of the rectum in exuviae. Very recently Ris (1913, p. 95) has stated that he is disposed to consider the "older statements of Dufour and Hagen on the union in *Calopteryx* larvae of the zygopterous with a rudiment of the anisopterous organ as an error of observation."

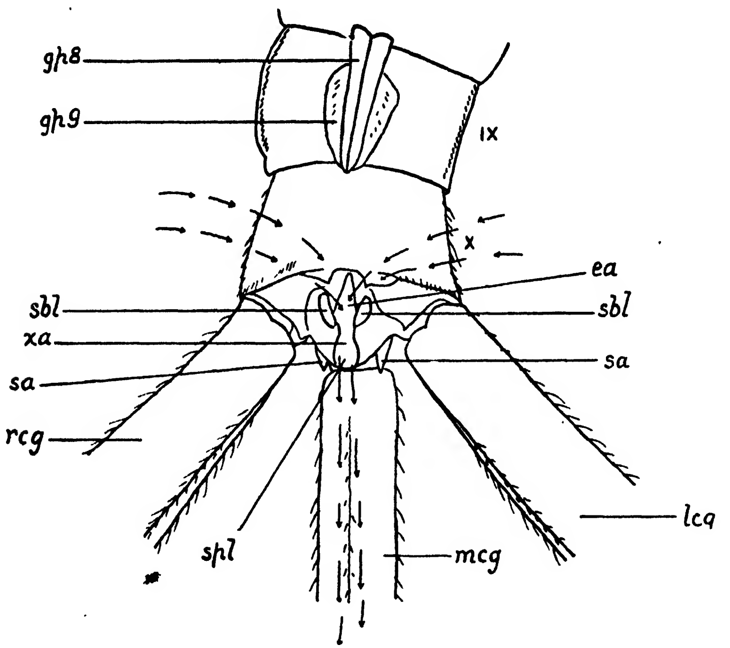
The present writer has recently made some observations on living larvae of *Calopteryx maculata* from the neighborhood of Philadelphia, as follows:

A male larva (body-length, exclusive of caudal appendages and of antennae, 17.5 mm., median caudal appendage 6 mm., lateral caudal appendage 8.5 mm.) placed in a Syracuse watch glass at 3.25 p. m. in barely enough water to cover the larva. The larva remained very quiet and was watched under a Zeiss binocular microscope with objectives a° and oculars 2. Anal expirations at the rate of 38 per minute were indicated by movements of sediment attached to the hairs on the median caudal gill.

The same larva was turned on its back at 3.30 p. m., all the other conditions remaining the same as before. The larva remained very quiet; 36 anal expirations per minute indicated as before. Powdered carmine was sprinkled on the water and floating on its surface showed very clearly the expulsions of water from the anus at a rate of 33 per minute. The carmine particles showed currents as indicated in the accompanying diagram (Text-fig. 2). The expulsions from the anus were accompanied by alternate contractions and expansions of abdominal segments 3-8, which were most marked near the lateral edges of the segments at their articulation with the next following segment. Observations on the direction of movement of carmine particles and particles of sediment *in* (not on the surface of) the water made it seem likely that the water entered the rectum through an aperture (*ea*) between the ventral margins of the right and left subanal plates and the posterior ventral margin of abdominal segment 10, and that it left the rectum by an orifice (*xa*), less easily seen in ventral view, between the supra-anal plate and the dorsal margins of the right

and left subanal plates. The chief evidence for the entrance orifice, which was not closed, was the behavior of a mass of flocculent substance, a little larger than the aperture, which, when placed over it, was rhythmically sucked inward.

A second, female, larva (body length, excl., etc., 20.5 mm., median caudal appendage 7 mm., lateral appendages 8.5 and 9 mm.) was placed on its back under the same conditions and similarly examined, carmine particles being sprinkled on the water; 40 anal expulsions per minute. In this case, however,



Text-figure 2. Ventral view of hind end of the abdomen of a female larva of *Calopteryx maculata* Beauv. From specimen 12 mm. long (excl. antennae and caudal gills) preserved in alcohol. The arrows show the direction taken by currents of water, as indicated by carmine particles suspended in the water, under the conditions described in the text, page 438. x 24.

ea, aperture between the subanal laminae, *sbl*, *sbl*, and the hind margin of segment 10; *gp8*, gonapophyses (ovipositor) of the 8th abdominal segment; *gp9*, gonapophyses (genital valves) of the 9th abdominal segment; *lcg*, left caudal gill; *mcg*, median caudal gill; *rcg*, right caudal gill; *sa*, superior appendages of imago (cercoids); *sbl*, subanal lamina; *spl*, supra-anal lamina; *xa*, aperture between the supra-anal lamina and the subanal laminae. In this figure the apertures *ea* and *xa* are shown as continuous, as they are in the preserved specimen from which the drawing was made. In the living larvae described in the text, these two apertures were separated from each other by the approximation of the subanal laminae, but internally each communicates with the rectal cavity. IX, X, ninth and tenth abdominal segments.

both entrance and exit of the water into and from the rectum seemed to be by the aperture *ea* between the ventral margins of the subanal plates and the hind ventral margin of abdominal segment 10.

In both larvae the expulsions were much more evident than the inhalations, the latter causing very much less movement of suspended or floating particles. From time to time, for intervals of one minute or longer, both inhalations and exhalations ceased.

In a transparent living larva of *Hetaerina americana* (dimensions corresponding to those of *Calopteryx* larva quoted: 8.5, 3, 4 mm.), examined under a Zeiss compound microscope, objective A, ocular 2, the rectal tracheal supply was clearly seen to be very similar to that figured for *Thaumatoneura* (Pl. XVI) in the present paper. Rhythmic pulsations in the rectum were distinctly visible at a rate of 45-53 "sets" per minute, each "set" consisting of 3-4 successive contractions of the rectal wall, followed by a longer pause of varying duration. Currents of water corresponding to the rectal pulsations were demonstrated by the use of carmine particles as described for *Calopteryx*. Water was expelled caudad from the vicinity of the anus 45 times per minute jerkwise, each jerk apparently synchronous with the pause following each "set" of rectal contractions. The ileum moved rhythmically, cephalad from the sixth to the fifth abdominal segment while the rectum was contracting, and caudad into the sixth segment again synchronously with the pause following each "set" of rectal contractions.

In the larva of *Cora,* the condition of the material did not permit of an exact statement as to the existence of rectal tracheal gills, but it was noted that the rectal walls appeared much less richly tracheated than those of the stomach. (Calvert, 1911*a*, p. 55; *cf.* pl. ii, ff. 17, 19).

RECTAL RESPIRATION. AGRIONINAE.

Schmidt-Schwedt (1891, p. 104) stated that larvae of *Agrion* and of *Lestes* do not possess respiratory movements through the anus and Tümpel (1908, p. 66) asserted that all

other Agrionidae [than *Calopteryx*] lack gut-gills (Darmkiemen), but breathe only by the caudal gills. On the other hand, Dewitz (1890, p. 504) saw in transparent Agrionid nymphs under the microscope a stream of water taken into and expelled from the rectum. Tillyard (1906, p. 415) recorded the larva of *Lestes leda* as suddenly projecting "itself forward by expelling the water from its body anally," which certainly suggests two functions, locomotion and respiration, associated in the rectum as they are in Anisopterous larvae. Babak and Foustka (1907, p. 538), studying the respiratory movements of the abdomen of Odonate larvae by means of the graphic method, obtained from "a small species of the Agrionid group" results entirely similar to those from experiments on two larger Libellulid species. Their figures show the differences in the height and frequency of the respiration curves, due to the absence or presence in varying quantities of oxygen in the water in which the larva was placed. Balfour-Browne (1909, p. 279) working on larvae of *Agrion pulchellum, Ischnura elegans, Pyrrhosoma nymphula* and *Erythromma najas,* after citing Dewitz's observation quoted above, says of the stream of water passing in and out through the anus:

from my observation it is a very weak one, nor is there any special apparatus surrounding the anus in this group to prevent ingress of foreign particles such as is found in the Anisopterids. If rectal respiration exists at all, it seems to me that it must be very slight and of but little importance, as I could not observe any increased number of contractions of the rectum in specimens of *Agrion* which had been deprived of their lamellae. In the absence of the lamellae, I think the whole of the respiration must be carried on through the skin.

It is remarkable that, as in the case of *Calopteryx,* no anatomical-histological studies have been made on the rectum of Agrionine larvae of Europe or of North America. All that exists hitherto appears to be the brief account of the rectum of the Costa Rican *Mecistogaster modestus* (Calvert, 1911*b,* pp. 452-3, pl. xvii, ff. 7, 10). The first part of the present paper gives a fuller description, of the rectal tracheal distribution at least, than any that has yet appeared.

Observation and experiment with carmine particles on living

larvae of *Argia moesta putrida* (dimensions as before: 7.5, 3 and 4 mm., and smaller), from the vicinity of Philadelphia, showed that a larva watched for two hours may give no sign of *rhythmic* rectal contractions, but that these may suddenly begin and then continue for varying periods. They consisted of sets of three rapidly successive contractions, every third contraction being of longer duration than the other two; 32 such sets per minute were noted. At other times sets of five contractions were noted. In some larvae, but not in all, the beginning of a set of rectal contractions was often synchronous with a slight shortening of the abdomen; the lengthening of the abdomen began before the contractions had ended. A rhythmic shortening and lengthening of the abdomen may perhaps furnish an indication of the existence of rectal contractions in opaque larvae. Successive removal of the three caudal gills in one larva was not followed by any immediate beginning of rectal contractions, although such were seen four hours later; the larva was not under continuous observation during all of that time, however. The observations of the *Argia* larvae were made chiefly under a Zeiss compound microscope, objective A, ocular 2.

LATERAL EXTERNAL ABDOMINAL TRACHEAL GILLS are now known for the following Calopteryginae:*

Euphaea splendens. Hagen, C. R. Soc. Ent. Belg, xxiii, p. lxvi, 1880; Zool. Anz. iii, pp. 160, 304, 1880.† Packard, Text-Book Ent. pp. 468-9, fig. 446, 1898.

Euphaea variegata. Ris, Tijdschr. Ent. lv, p. 168, pl. 6, figs. 9, 15-20, pl. 7, figs. 10-12, pl. 8, figs. 13, 14, 1912.

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*The references are to descriptions of the larvae only.

†Hagen states (*l. c.* p. 160): "Die ersten derartigen Larven erhielt ich von Nietner in Ceylon und habe über sie mündlich in der Naturf.-Versamml. in Stettin 1861 berichtet." The Versammlung der deutscher Naturforscher und Aerzte in Stettin was in 1863, not 1861. The Bericht of that [38th] Versammlung for September 23, 1863, p. 137, reads "Herr Dr. Hagen über Respirations-Organe von Euphaea splendens, woran sich eine Discussion schloss, an der sich besonders Director Loew und Prof. Grube betheiligten," but nothing more. The Versammlung of 1861 was at Speyer and the Bericht thereof contains nothing by Hagen and nothing on *Euphaea.*

Anisopleura comes? Needham, Ent. News, xxii, p. 149, pl. v, figs. 1-3, 1911.

Euphaea dispar? Hagen, C. R. Soc. Ent. Belg., xxiii, p. lxvi, 1880.

Bayadera indica. Needham, Ent News, xxii, p. 150, pl. v, figs. 4-7.

Anisopleura comes? Hagen, C. R. Soc. Ent. Belg., xxii, p. lxvi, 1880.

Cora chirripa. Calvert, Ent. News, xxii, p. 49, pls., ii, iii, 1911.

It is not stated whether these lateral gills are kept in movement during life or not.

STIGMATA (SPIRACLES).

Dewitz (1890, pp. 504, 526), on immersing Agrionid nymphs in diluted alcohol, or on raising or lowering the temperature of the water in which they were contained, saw air escape from a thoracic stigma of one side of the body. As the older nymphs crawled up to the surface of water, which had been boiled, and exposed their dorsal thoracic surface, he inferred that they inspired atmospheric air.

By subjecting the early stages of Odonata to the action of oleo-ether and to partial vacua, Portier (1911, pp. 216-7) concluded that in *Calopteryx,* as in *Aeschna* and *Libellula,* the tracheal system is not closed to air, although not permeable to water, fats or their solvents. In the younger *larvae,* one or the other of a pair of ventral spiracles at the junction of thorax and abdomen allows passage to air, while in the older *nymphs* these ventral stigmata are lacking, but one or other of a pair of anterior dorsal thoracic [mesothoracic] spiracles transmits air from within or from without.

Bervoets (1913, pp. 25-26) also employed the vacuum method. In larvae of *Agrion* 3 mm.* long he was unable to perceive any discharge of gas until he cut the caudal gills; in larvae 5 mm.* in length and longer, bubbles of gas issued from the dorsal stigmata between the pro- and meso-thorax, always more abundantly from one side than from the other.†

*These dimensions were exclusive of the caudal appendages.

†Bervoets has used (pp. 27, 29) the term *Isoptera* for the Agrionidae, evidently in contrast with Anisoptera. Isoptera is, of course, preoccupied as an ordinal name for the Termites.

These experimental researches on the permeability of the spiracles to air may afford an explanation of the results obtained by East (1900, p. 212), who kept nymphs of *Erythromma najas* and of *Agrion puella* alive, out of water, for one month and for thirty-three days, respectively. They had no food during this period and yet the nymph of *E. najas* moulted in the midst of it.

Conclusion.

From the various data which have been brought together here, it seems reasonable to suppose, at least until much more exact experiments show the limitations of each mode of respiration for different stages and for different species of Zygopterous larvae, that the general body-surface, the caudal processes, the rectal epithelium, certain spiracles and, in a few species, lateral external abdominal tracheal gills, *all* contribute to satisfying the needs of the organism for oxygen. A classification which regards the larvae or nymphs of any one group as exclusively or predominantly Caudobranchiate is not justified by our present knowledge. The fact that the larvae of *Thaumatoneura* spend much of their lives moistened by, but not submerged in, water, tempts one to refer the relatively small surface of their caudal appendages ("gills") to this mode of life. The similarity of their rectal tracheation to that of the larva of *Hetaerina americana* and the existence of rectal respiration in the latter lead one to expect that a similar condition will be demonstrated by observations on living *Thaumatoneura* larvae.

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Oustalet, E. 1869. Note sur la respiration chez les nymphes des Libellules. *Annales d. Sciences Naturelles* (5) *Zool.* xi, pp. 370-386, pls. 10-12.

Scott, G. G. 1905. The Distribution of Tracheae in the nymph of *Plathemis lydia*. *Biol. Bull.* (Wood's Hole) ix, pp. 341-354. 8 text-figures.

Destructive Grasshoppers in Costa Rica (Orth.).

Señor Anastasio Alfaro, Director of the Museo Nacional of Costa Rica, has described the invasion of Costa Rica by locusts in the present year in *Revista de Education*, San José, Oct., 1915. The species concerned, identified by Mr. J. A. G. Rehn, are *Schistocerca paranensis* and *S. zapoteca*, the former predominating. The invaders entered from the north in two columns, one along the Pacific lowlands, the other along those of the Atlantic. A detachment from the latter column crossed the mountains by the Rio San Carlos and Zarcero into the province of Alajuela. Previous locust years in Costa Rica were 1659, 1731, 1774, 1800, 1852 and 1876.

Some North American Diptera from the Southwest—Paper III.*

A Revision of the Species of the Genus Mythicomyia.

By E. T. Cresson, Jr., Academy of Natural Sciences, Philadelphia.

The material upon which this paper is based was collected in western Texas, Arizona and New Mexico by J. A. G. Rehn and H. L. Viereck in the late spring of 1902. The collection is unusually rich in several little known genera, of which this anomalous one is especially favored. The study of the material resulted in recognizing eight distinct species, including four considered new. Of the four previously described species three of these are recognized in the material at hand. By courtesy of the United States National Museum, I have been enabled to examine the material there including Coquillett's types. I have, therefore, seen the types of all the known species. One of the new species and some of the records were obtained from the United States National Museum collection and are so credited.

Of the students who have given this genus any study, I think Coquillett was correct in considering it to belong to the Empididae, and he ably states his reasons for this in Entomological News, iv, 209. Williston, in his Manual[1], notes that it should probably accompany *Hilarimorpha* in the Leptidae. In the third edition of his Manual he does not include it in any of the tables of genera, but mentions the genus in a note[2] and figures the wing, antenna and entire insect under the Bombyliidae and Empididae. Melander includes it in his Monograph of the Empididae[3] under the subfamily Mythicomyinae accompanied by *Hilarimorpha,* but does not otherwise commit himself as to the probable relationship. Aldrich and Kertesz in their catalogues place both genera in the Leptidae.

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*Paper I. Tr. Am. Ent. Soc. xxxii, 279-288, 1906; Paper II. Tr. Am. Ent. Soc. xxxiii, 99-108, 1907.

1. Ed. 2, p.73.
2. P. 218.
3. Tr. Am. Ent. Soc. xxviii, p. 336.

I do not know the genus *Hilarimorpha* and therefore cannot say whether or not it is related to *Mythicomyia*, but I think it probably is. As to the genus *Mythicomyia*, I agree with Coquillett in placing it in the Empididae, and with Melander in making it typical of a distinct subfamily. Its affinity to the Bombyliid genera allied to *Geron* and *Rhabdopsephalus* may be considered, but I cannot associate it with the Leptidae.

I find the anal cell to be either closed or distinctly open, so this character is of no family importance. The form of the antennae and the venation, except as to the anal cell, are constant in the material examined. Taking these, as well as the sum of the other characters, into consideration the genus surely favors the Empididae, and may be distinguished by the short second vein ending in the first.

On account of the dissimilarity between the sexes, it is difficult to associate them in many cases, and it is possible that some synonomy is created. This is, of course, unavoidable with our present limited knowledge of the species. However, synonomy is much preferable to misidentification.

MYTHICOMYIA.

1893. Coquillett, Ent. News, iv, 209.
1896. Coquillett, Proc. U. S. Nat. Mus., xviii, 409.
1896. Williston, Man. N. A. Dipt. ed. 2, 73 (note).
1902. Melander, Tr. Am. Ent. Soc., xxviii, 337.
1905. Aldrich, Catalogue, 218.
1908. Williston, Man. N. A. Dipt. ed. 3, 218 (note).
1908. Kertesz, Cat. Dipt. iii, 333.

Destitute of macrochaetae. Head globular, attached by a distinct neck. Antennae porrect; first joint very short, indiscernible; second as long as broad; third at least as broad as second, lanceolate, elongate, not annulated, much longer than first and second together; style terminal, robust, conical or cylindrical, pointed, much narrower than third. Eyes of male contiguous, with enlarged facets above. The ocellar tubercle prominent with the ocelli widely separated and equidistant. Proboscis porrect, rigid, without labella. Palpi minute.

Thorax hemispherical, convex above, higher than long, hunch-backed. Abdomen ovate, pointed, with seven segments

in both sexes. Hypopygium distinct, complicated. Legs moderately slender; tibiae at most with short spurs; hind tibiae and tarsi of male sometimes with characteristic appendages or processes; pulvilli well developed; empodium hairlike. Wings with second vein short, ending in and near apex of first; vein seven weak, sometimes evanescent; first section of fourth vein obliterated or faint; marginal cell closed; only one submarginal cell; four open posterior cells; anal cell narrowly open, or closed near margin.

Genotype.—Mythicomyia rileyi Coquillett.

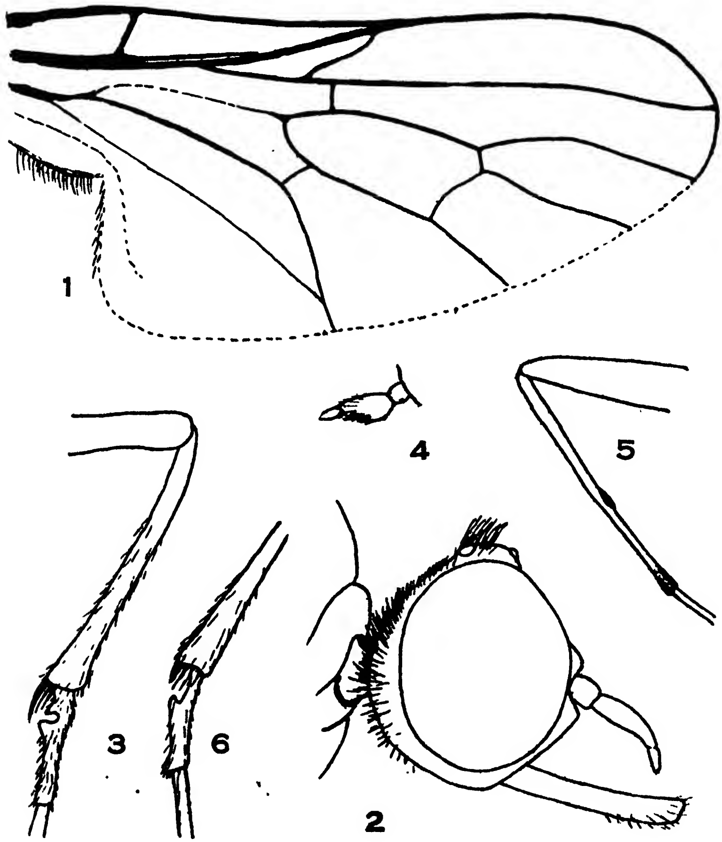


Fig. 1. *Mythicomyia flavipes*: wing. 2. Ibid.: profile of head of male. 3. *M. armata*: hind tibia and base of tarsi. 4. *M. scutellata*: antenna. 5. *M. armipes*: fore tibia. 6. Ibid.: basal joint of hind tarsi.

Table of Species.

Males.

1. Second antennal joint and legs yellow .... *flavipes*
   Antennae black 2
2. Basal joint of hind tarsi notched near base beneath.............. 3
   Not so .... *atra*
3. Hind tibiae stout with an apical spur extending to or beyond the notch 4
   Hind tibiae without any spur.. 5
4. Fore tibiae very long and slender with black swelling near middle; hind tibial spur short; basal joint of hind tarsi shorter than following .... *armipes*
   Fore tibiae normal; hind tibial spur very long; basal joint of hind tarsi longer than following.. *armata*
5. Tibiae and femora black .... *tibialis*
   Tibiae and only apical half of femora yellow .... *rileyi*

Females.

1. Second antennal joint and legs yellow .... *flavipes*
   Antennae black 2
2. Shining species with yellow scutellum .... *scutellata*
   Opake pruinose species 3
3. Legs entirely yellow .... *rileyi*
   Femora and tibiae marked with black .... *pictipes*

Mythicomyia scutellata, Fig. 4.

1902. Coquillett, Proc. U. S. Nat. Mus. xxv, 102.

♀. Black, polished, sparsely pilose. Frons at antennae, face, cheeks, oral margin, humeri, notopleural stripe and post alar spot, scutellum, pleural stripe sometimes faint or wanting, halteres, apices of abdominal segments broad laterally, venter, knees, apices of tibiae, tarsi, or sometimes entire legs except apices of tarsi, yellow.

Third antennal joint ovate, broader than second, somewhat longer than broad (fig. 4) ; style cylindrical hardly half as long as third. Proboscis short not longer than head. Anal cell open. Length 1.5 mm.

♂. Unknown.

Type.—♀, Williams, Arizona, June 6, 1902 (H. S. Barber), [U. S. N. M. No. 6195].

Paratypes.—3 ♀ ; topotypical.

Before me are four specimens from Alamogordo, New Mexico, and one from Highrolls, New Mexico, collected in April and May, which I refer here without doubt. The color of the legs varies considerably and it is questionable whether such can be used in the separation of the species. In three of these

individuals the mesonotum is black, the scutellum is much smaller than usual, nearly semi-circular, not broader than long. The other specimen (Alamogordo, N. Mex., May 1) is almost entirely yellow, with antennae, vertex, three broad subcoalescing mesonotal stripes, the middle one abbreviated posteriorly and the others anteriorly, and a median series of small spots on the apices of abdominal segments, black. This may prove to belong to a distinct species, but it is similar in other respects to the remainder of the series. A peculiarity in one of the former series (Alamogordo, N. Mex., May 1) is the absence of the posterior cross vein in one of the wings, the second posterior vein curving from the sixth vein so as to keep its original position in entering the margin of the wing. This may possibly be regarded as a point towards establishing an affinity with the Empididae.

In the U. S. National Museum are 2 females with the same data as those of the typical series, but collected on flowers of *Purshia tridentata;* also a female from Bright Angel, Colorado Canyon, Arizona, 2300 ft. alt., May 10, 1903 (H. S. Barber). The former two may belong to the original typical series.

Mythicomyia flavipes new species. Figs. 1 and 2.

♂. Black, densely gray pruinose and moderately long white pilose. Frons, face, cheeks, oral margin, second antennal joint, humeri, postalar spot, margin of scutellum, halteres, several spots beneath wings, narrow apices and broad lateral apical angles of abdominal segments, venter, hypopygium, apices of fore coxae, all legs except apices of tarsi and basal spot above on femora, and veins of wings, yellow.

Line of demarcation of upper and lower facets of eyes distinct. Proboscis protruding beyond length of head. Third antennal joint three times as long as second, hardly as broad, attenuated at both extremities; style one-third as long as third, conical. Anal cell closed. Tarsi not notched. Length, 2 to 3 mm.

♀. Similar but pile shorter. Yellow and densely pruinose with eyes, ocellar tubercle, third antennal joint and style, mesonotum except broad lateral margins and a divided quadrate spot near base of scutellum, pleural spots, narrow bases of abdominal segments, black. Proboscis and tarsi brown.

Type.—♂, El Paso, Texas, April 4, 1902. [A. N. S. P. No. 6097].

Paratypes.—9 ♂, 18 ♀, topotypical.

Homotypes.—2 ♀, Alamogordo, New Mexico.

The yellow legs and the conspicuous second antennal joint are the salient characters. There is some variation shown in the above series in the color pattern. In the males the lateral mesonotal margins may be entirely yellow and the femora quite dark basally, especially the fore pair. In the females the abdominal segments may be broadly black, especially the second, and the yellow mesonotal quadrate spot sometimes wanting.

Mythicomyia pictipes.

1902. Coquillett, Proc. U. S. Nat. Mus. xxv, 102.

♀. Black, opake, gray pruinose, sparsely white pilose. Frons at antennae, face, cheeks, oral margin, humeri, broad lateral mesonotal margins, scutellum except discal spot and lateral margins, pleural spots, halteres, apices of abdominal segments dilated laterally then becoming narrow again just over on to the ventral lobes, then dilating to the ventral margins, venter and legs, except femora and tibiae above and tarsi apically, yellow.

Third antennal joint narrow, elongate, about four times as long as broad; style half as long as third joint. Abdominal spiracles prominent, shining. Anal cell open. Length, 2.5 mm.

♂. Unknown.

Type.—♀, Williams, Arizona, May 29, 1902 (H. S. Barber), [U. S. N. M. No. 6196].

Paratype.—1 ♀, topotypical.

I have seen a ♀ Catal Springs, Arizona, Apr. 14 (Hubbard & Schwarz), [U. S. N. M. Coll.]; also a ♀, Alamogordo, New Mexico, Apr. 20, 1902 (Rehn & Viereck), [A. N. S. P. Coll.].

Mythicomyia tibialis.

1896. Coquillett, Proc. U. S. Nat. Mus. xviii, 409.

1902. Melander, Tr. Am. Ent. Soc. xxviii, 338.

♂. Black, gray pruinose, especially beneath: white pilose, especially long on occiput and abdomen. Frons, face, cheeks, humeri, notopleural stripe, post-alar spot, halteres, hypopygium largely, knees and bases of hind tarsi, yellow or whitish.

Third antennal joint three times as long as broad, tapering to the style; latter one-third length of third joint. Mesonotum opake black with a broad medial shining submetallic stripe. Abdomen opake black, elongate, narrow. Hind tarsi with rounded notch as in *armata* but without tibial spur. Anal cell open. Length, 3.5 mm.

♀. Unknown.

Type.—♂, Los Angeles County, California, July (D. W. Coquillett), [U. S. N. M. No. 3190].

Mythicomyia rileyi.

1893. Coquillett, Ent. News, iv, 209.

1902. Melander, Tr. Am. Ent. Soc. xxviii, 338.

♂. Black, rather densely gray pruinose. Occiput above and ocellar tubercle behind white. Frons, face, cheeks, oral margin, humeri, post-alar and notopleural line, pleural spots, halteres, narrow apices of abdominal segments, apices of femora, bases of tibiae and tarsi, whitish; apices of tibiae brown.

Third antennal joint lanceolate, scarcely broader than second, three times as long as broad; style cylindrical, half as long as third. (Antennae of type missing.) Hind tarsi notched at base. Anal cell open. Hypopygium shining, exserted, larger than preceding segment. Length, 1.5 to 2.0 mm.

♀. Similar, but lower frons, broad notopleural stripe, scutellum except discal spot, all legs, including coxae, yellow. Proboscis twice as long as head.

Type.—♂, Kern County, California, May (D. W. Coquillett), [U. S. N. M.].

This species seems very closely allied to *tibialis,* but is much smaller, the legs are lighter, the hypopygium is black and the abdomen not velvety black.

I have seen another male in the U. S. National Museum from Mesilla, New Mexico, Apr. 22 (T. D. A. Cockerell; on *Erigeron* flowers). There are before me 2♂, 5♀, from Alamogordo, New Mexico, Apr. 23, 1902, which seem to be the same, and from which the above description of the female was drawn. The males, however, have the hypopygium inconspicuous, and one of them has no white on the ocellar tubercle.

Mythicomyia armipes new species. Figs. 5 and 6.

♂. Black; frons except ocellar tubercle, face, cheeks, humeri, post-alar calli, pleural marks, halteres, apices of abdominal segments, apical half of fore femora, apices of middle and hind femora, fore tibiae except a medial spot and apices, bases of middle tarsi and wing veins, yellow. Wings hyaline.

Opake; occiput, lateral margins of mesonotum, pleurae, lateral margins and apical segments of abdomen and femora grayish.

Third antennal joint three times as long as broad; style half as long as third. Abdomen elongate; hypopygium inconspicuous. Legs long,

especially fore tibiae which are much longer than their femora and have a shining black swelling beneath, slightly beyond the middle (Fig. 5). Middle tibiae sinuate. Hind tibiae dilated apically with a short stout spur at flexor apex accompanied by a comb of few long hairs; the spur not over-reaching the tarsal notch. Basal joint hind tarsi much shorter than following joint with a large notch at its base (Fig. 6). Anal cell open; sixth vein weak. Length, 1.7 mm.

♀. Unknown.

Type.—♂, Las Cruces, New Mexico, Sept. 25, 1895 (T. D. A. Cockerell), [U. S. N. M. No. 19925].

This species I found associated with *M. tibialis* Coq. in the U. S. National Museum collection. It is very similar to that species, but the characters on the legs are at once distinctive. The tibial spur simulates that of *armata,* but is not as long and the tarsal notch is more extensive. The second joint of the hind tarsi is noticeably much longer than the preceding one and the fore tibiae also unusually long and slender with the characteristic black swelling at its middle. I am not aware whether these characters exist in *tibialis* Coq. or not.

Mythicomyia armata new species. Fig. 3.

♂. Black, thinly gray pruinose. Frons, face, cheeks, oral margin, humeri notopleural line and post-alar and pleural spots, halteres, apices of abdominal segments, venter, apical half of fore and of middle femora, hind femora except basal spot, all tibiae and bases of tarsi, yellow.

Third antennal joint ovate twice as long as second; style cylindrical, more than half as long as third. Hind tibiae with a long apical spur, over-reaching the tarsal notch (Fig. 3). Anal cell open. Length, 1.7 to 2.0 mm.

♀. Unknown.

Type.—♂, Highrolls, New Mexico, May 30, [A. N. S. P. No. 6098].

A specimen before me from the Yosemite Valley, California, lacks the antennae, but it is evidently this species.

The spur of the hind tibia, which is no doubt functional in connection with the tarsal notch, is very characteristic of this species. It is not present in any other species known to me, at least as strongly developed as here. Usually such spurs are minute and scarcely noticeable.

Mythicomyia atra new species.

♂. **Black, shining, but faintly pruinose in certain aspects, sparsely white pilose. Frontal triangle, face, cheeks, humeri, narrow notopleural line, faint post-alar spot, narrow posterior margin of mesopleural, halteres and spot below, narrow apices of abdominal segments and knees, yellow.**

Slender species. Proboscis shorter than head. Third antennal joint two and one-half times as long as second, hardly as broad, attenuated apically; style one-third as long as third, cylindrical, pointed. Face very short and cheeks very narrow. Legs slender with hind tibiae and tarsi normal. Hypopygium inconspicuous. Anal cell broadly open and anal vein evanescent. Length, 1.7 to 2.2 mm.

♀. Unknown.

Type.—♂, Highrolls, New Mexico, May 31, 1902 [A. N. S. P. No. 6099].

Homotypes.—2 ♂, Alamogordo, New Mexico, April.

Allied to *tibialis*, but the hind tarsi are not notched, and the prunosity very faint.

Twenty-eighth Annual Meeting of the American Association of Economic Entomologists.

The 28th annual meeting of the American Association of Economic Entomologists will be held at Columbus, Ohio, December 27 to 30, 1915. The sessions will be called to order in the Botany and Zoology Hall at the Ohio State University.

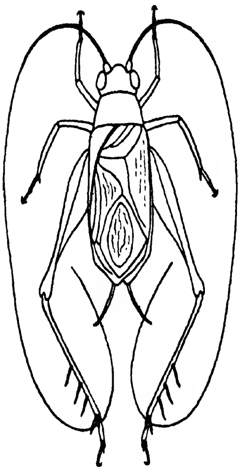
The opening session will be held at 1:30 P. M. Monday, December 27, when the annual reports and address of the President will be delivered. On Monday evening the section on Apiary Inspection will hold a meeting at 8:00 P. M.

The Association will continue its meetings on Tuesday at 10:00 A. M. and 1:30 P. M.; on Wednesday at 1:30 P. M., and the final session will be held Thursday at 10:00 A. M. The section on Horticultural Inspection will hold its meeting on Tuesday at 8:00 P. M. and Wednesday at 10:00 A. M.

Hotel headquarters of the Association will be at the Southern Hotel on South High St.

A smoker will be tendered by the Ohio entomologists to all visiting entomologists on Wednesday evening after the public address before the Entomological Society of America.

A large and varied program of papers will be presented and many members have already signified their intention to attend the meeting.—A. F. Burgess, *Secretary.*



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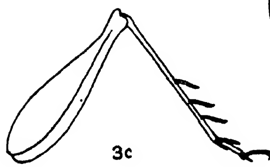

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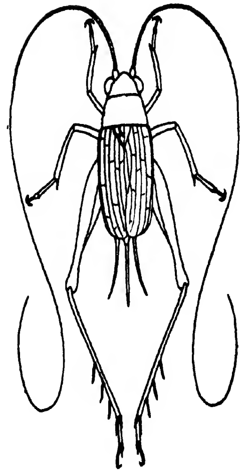

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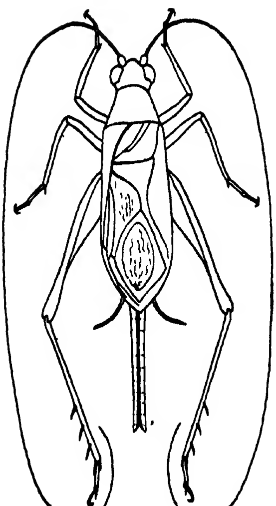

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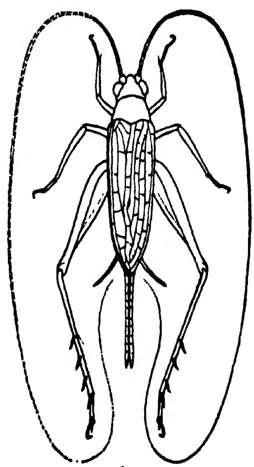

4B

MIAMI, FLORIDA, ORTHOPTERA—HEBARD.

Dermaptera and Orthoptera Found in the Vicinity of Miami, Florida, in March, 1915—(Part II).

By Morgan Hebard, Philadelphia, Pa.

(Plate XX.)

Tettigoniidae.

Arethaea phalangium (Scudder). Southside, Miami, III, 16, 1915, (H.; undergrowth of pine woods), 1 very small juv.

This tiny specimen (length 2.8 mm.), with its very long limbs and antennae, looked like a bit of greenish white fluff.

Stilpnochlora marginella (Serville). Brickell's Hammock, Miami, III, 5, 1915, (H.; beaten from heavy shrubbery in dense jungle), 1 juv. ♀.

The length of this immature individual is 14.2 mm.

Scudderia texensis Saussure and Pictet. Southside, Miami, III, 6, and 16, 1915, (H.), 2 ♂, 2 juv. ♂, 3 juv. ♀, 1 very small juv.

This species is widely distributed and locally not uncommon in the undergrowth of the pine woods. Four instars are represented by the immature material before us.

Phrixa maya Saussure and Pictet. Brickell's Hammock, Miami, III, 5, 1915, (H.; beaten from heavy shrubbery in dense jungle), 1 very small juv.

Careful and long continued work on two days, including many hours constant beating, secured this single small specimen (length 8 mm.) at a point but a short distance from the spot at which Mr. Wm. T. Davis captured an adult male on September 22, 1913, the first record for the genus and species from the United States.[12] In spite of the immature condition of the present specimen, the distinctive generic features are readily recognizable and the adult from the same spot fixes satisfactorily the specific identity as well.

The beating work necessary to secure this specimen was particularly trying, as during the entire time the only other specimens of Orthoptera secured were the immature example of *Stilpnochlora marginella* recorded above and a very small

[12] Recorded by Wm. T. Davis, Jour. N. Y. Ent. Soc., XXII, p. 197. (1914).

immature specimen of a Tettigoniid genus, which we believe has not yet been recorded from this region but which we can not determine from the material at hand.

Amblycorypha floridana floridana Rehn and Hebard. Virginia Key, III, 11, 1915, (H.; beaten from luxuriant vegetation), 1 very small juv. Cape Florida, Key Biscayne, III, 12, 1915, (H.; luxuriant vegetation in clearing), 2 juv. ♀.

The Cape Florida specimens have been bred; the larger when taken, reached maturity March 22; the other, which was very small when taken, became adult May 13.

Amblycorypha uhleri Stål. Southside, Miami, III, 6, 1915, (H.; undergrowth of pine woods), 1 juv. ♂.

Microcentrum rhombifolium (Saussure). Miami, III, 4, 1915, (H.; on shrubbery, stridulating at night), 2 ♂.

This insect was not uncommon about the town in the trees and shrubbery, as could be determined on warm evenings by the frequently heard stridulations. On nights when the temperature fell at dusk below 65° (normally an infrequent condition at Miami, but the usual occurrence at the time the collections here studied were made) all Orthopteran stridulations ceased.

Microcentrum rostratum Rehn and Hebard. Southside, Miami, III, 6, 1915, (H.; undergrowth in pine woods near hammock where occasional low green bushes were to be found), 1 ♀, ♂.

Belocephalus sabalis Davis. Miami, VII, 11 and VIII, 19, 1904, (W. S. Dickinson), 2 juv. ♀. [Hebard Cln.]. [13] Southside, Miami, III, 6, 1915, (H.; undergrowth in pine woods), 2 very small juv. ♀

One of the specimens from Southside has been kept alive and is flourishing on a diet principally composed of lettuce. Its actions show how absolutely nocturnal the species is; this

[13] Two females recorded from Miami and Chokoloskee, as *subapterus* (the only species of the genus at that time described) by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 44. (1905.) can at the present moment not be found. There is little doubt that these records are erroneous, as that species is not known and is probably not present in extreme southern Florida. The specimens probably represent this, the most generally distributed species in this region. The female from Miami was from the same collection as the immature females here recorded.

specimen resting rigid in some concealed position during the day, with cephalic limbs and antennae directed straight forward and median and caudal limbs straight backward, but at night moving actively about and extremely alert and rapid in its movements.

We have before us two large immature females of this species taken by E. A. Schwarz at Cocoanut Grove, Florida, in May, 1887, and two adult brown females taken by the same collector during that year in Dade County. The female of this species closely resembles the male in all features common to both sexes, the ovipositor is decidedly shorter than in *B. subapterus* and is weakly upcurved. The measurements of these specimens are: length of body 34.2 and 39.5, of vertex from tooth to tip 3.1 and 3.3, of pronotum 9. and 9.9, of exposed portion of tegmen 1.8 and 2.2, of caudal femur—and 21.8, of ovipositor 15.2 and 16.2, width of tegmen 2.3 and 2.6 mm.

Orchelimum concinnum Scudder. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; very few juv. in salt marsh), 1 very small juv. ♀.

The very small immature examples seen were probably the very first of this species to appear. In July, the marshes of this region swarm with the young of this species.

Conocephalus gracillimus (Morse). Southside, Miami, III, 6 and 16, 1915, (H.; locally not scarce in heavier patches of low undergrowth and grasses in the pine woods), 9 ♂, 1 ♀, 2 juv. ♀.

Of the above series the adult female alone has the face, lower portions of the lateral lobes of the pronotum, pleura, ventral portion of abdomen, basal half of ovipositor and the tibiae brilliant green (Scheele's green), the other specimens have these portions isabella color varying to yellowish olive.

Odontoxiphidium apterum Morse. Miami Beach, III, 12, 1915, (H.; one specimen in beach vegetation back of strand), 1 very small juv. Southside, Miami, III, 6, 1915, (H.; beaten from undergrowth of pine woods), 1 very small juv.

Atlanticus glaber Rehn and Hebard. Southside, Miami, (H.; rare but widely distributed through undergrowth of pine woods), III, 6, 1915, 4 juv. ♂, III, 16, 1915, 1 ♂, 3 juv. ♂.

These immature individuals were kept alive and all but one successfully reached maturity, the dates being April 12, 13,

17, 18, 20, 22 and 24. Two specimens were, when taken, in the next to the last instar preceding maturity; these were the last two to become mature. The species was very scarce but widely distributed, all of the work undertaken on two days in the pine woods being with the main purpose of securing this insect.

GRYLLIDAE.

Scapteriscus abbreviatus Scudder. Musa Isle, III, 4 and 10, 1915, (H.), 3 ♂, 5 ♀, 16 juv. in four last instars.

The soft fat abdomen of this species is in life whitish and distinctly paler than the hard portions of the insect.

The present series was dug out of sandy soil in a grape fruit grove during the afternoon. Individuals were found to burrow but a few inches beneath the surface of the ground, coming to the surface to feed beneath decaying grape fruit. Scarcely any were seen in the burrows frequently disclosed upon overturning grape fruit and these instantly disappeared in the burrows. The series was taken by rapidly overturning the soil in the vicinity of such debris and also in areas of scant weeds and about the roots of grape fruit shoots. In many places nothing was found, while in a few spots a number of individuals would be exposed, though everywhere the ground was tunnelled by these insects.

Everywhere about Miami in sandy soil the insect, which is locally called "cricket-mole", is said to do decided damage, particularly to farm truck. One of the older inhabitants informed the author that he remembered when these insects were not found in this region and that they had been accidentally introduced in manure from Key West.

Ellipes minuta (Scudder). South of Brickell's Hammock, III, 3, 1915, (H.; scarce in salt marsh near border), 1 ♂, 1 ♀.

These individuals have the wings concealed by the tegmina.

Cryptoptilum antillarum (Redtenbacher). North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.; under bark of live oak while searching for *Obligacanthopus prograptus*), 1 ♀, 1 juv. ♀ in last instar. Cape Florida, Key Biscayne, III, 12, 1915, (H.; beaten from luxuriant vegetation in clearing), 1 juv. ♂ in early instar.

Cryptoptilum trigonipalpum Rehn and Hebard. Brickell's Hammock, Miami, III, 15, 1915, (H.), 1 ♂, 1 ♀, 2 juv. ♂ in intermediate instar, 2 juv. ♀ in two intermediate instars.

This entire series was found on a chilly morning under the bark of *Exothea paniculata* at about ten feet from the ground, about which tree trunk were touching leaves from an adjacent shrub. Under the loose bark of the same tree *Oligacanthopus prograptus* and *Orocharis gryllodes* were found.

Cycloptilum zebra Rehn and Hebard. North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.), 2 juv. ♂, 1 juv. ♀, in two early instars.

These specimens were found in low vegetation about the foot of live oaks in an open grove, while searching on these trees for *Oligacanthopus prograptus.*

Oligacanthopus prograptus Rehn and Hebard. (Pl. XVIII, figs. 2A, 2B.) North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.), 1 juv. ♂, 1 juv. ♀. Brickell's Hammock, Miami, III, 4, 5 and 15, 1915, (H.), 7 ♂, 5 ♀, 20 juv. ♂, 18 juv. ♀. South edge of Brickell's Hammock, Miami, III, 3, 1915, (H.), 1 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀.

The present series of fifty-seven specimens was taken by peeling off loose bark on two typical trees of the hammock jungle, *Exothea paniculata* and *Coccolobis laurifolia,* and on live oaks, *Quercus virginiana,* a few of which latter trees are found scattered through the pine woods on the south border of the hammock and groves of which are distributed along the north edge of the hammock. Often several trees would be thoroughly examined without success, but usually two or three specimens would be found and rarely six or seven, on the same tree. When revealed, the tiny insects either fell with the bark or remained usually motionless when they could easily be made to jump into the beating net, which was held below the spot under investigation to catch the bark and any specimens which might fall with it. Without such use of a net the species would prove very difficult to capture. The species is apparently wholly nocturnal and individuals probably seldom leave the tree trunks. This latter is indicated by the peculiar silvery general coloration of the insects, mottled and speckled with dark brown, which blends perfectly with the bark of the trees upon which they are found, but which would cause them

to be conspicuous under many other environmental conditions. The present species was hitherto known only from the unique female type, taken from under a sign on a live oak on the north border of Brickell's Hammock by the author on February 16, 1904.[14]

Allotype: ♂ ; Brickell's Hammock, Miami, Florida, March 5, 1915. (Hebard; under bark of *Exothea paniculata.*) [Hebard Collection.]

Description of Allotype. Very similar in size and form to the type. Pronotum with dorsum transversely very gently arcuate, curving sharply laterad, cephalic and caudal width equal, this dimension slightly less than length, lateral outlines of disk weakly convex, cephalic margin weakly concave, caudal margin very weakly convex and nearly straight. As in the female sex, no tegmina or wings are developed. Every portion of the insect is heavily clothed with scales excepting the eyes, cephalic portion of the face, mouth-parts and antennae. Titillatores represented by minute, elongate projections which are cylindrical, straight, tapering distad gently to apex which reaches above depressed distal portion of roughly shield-shaped supra-anal plate. Sub-genital plate transverse, with distal margin broadly arcuate. Color pattern distinctive as in the type, with which the allotype agrees in all other characters given in the original description.

Coloration. As in the type, the series before us shows the four parallel vertical dark bars on the vertical cephalic face of the interantennal protuberance, some specimens have these bars unusually heavy but in no case do they fuse. The absence of some of the scales in the type made the normal color pattern, produced by the light and dark scales, indistinguishable. This is found to be constant in the series before us and is illustrated by the accompanying figure of the allotype. We also figure the cephalic aspect of the head of this specimen, as this figure of the type accompanying the original description is very badly out of proportion. These features of coloration are found the same in the five instars of the immature condition before us.

Measurements (in millimeters)

	Length of body	Length of pronotum	Caudal width of pronotum	Length of caudal femur	Length of ovipositor
Allotype ♂, ...	6.4	1.7	1.6	3.8	....
Topotypic ♂, (7)...	6.2-6-7	1.5-1.7	1.4-1.6	3.7-4.2	....
Type, ♀	6[15]	1.5	1.4	3.7	2.5
Topotypic ♀, (6)...	6.-6.7	1.6-1.7	1.6-1.7	4.1-4.3	2.7-3

[14] Fully described by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 219. (1912.)

[15] With the original description this measurement is given as 5.8 mm. as the authors supposed that the head was carried with dorsal surface declivent distad. We find that the head is carried horizontally, with occiput partially concealed by the pronotum but with distal portion of occiput, interantennal space and dorsum of vertex, in the same plane with the dorsum of the pronotum.

In the immature series, the last instar preceding maturity is represented by 7 ♂, 8 ♀ (length of body averaging about 5.6, of ovipositor 1.7 mm.); the previous instar by 5 ♂, 7 ♀ (length of body averaging about 4.7, of ovipositor .7 mm.); the second from the last instar by 8 ♂, 2 ♀ (length of body averaging about 4.3 mm., ovipositor valves joined but not extruded); the third from the last instar by 2 ♂, 2 ♀ (length of body averaging about 4 mm., ovispositor valves not yet joined), and fourth from the last instar by 2 ♀, (length of body averaging about 3.3 mm., ovipositor valves not yet joined).

Hygronemobius alleni (Morse). Mangrove swamp, edge of Brickell's Hammock, Miami, III, 15 and 16, 1915, (H.; bare muck and tidal litter in red mangrove swamp), 1 ♂, 7 ♀, 4 juv. ♂, 6 juv. ♀.

This series, which constitutes the first record for the genus from the United States, has recently been recorded and fully commented upon by the present author.[16]

The immature individuals represent three instars; the instar preceding maturity by 2 ♀ (length of body averaging approximately 4.8 mm.), the previous instar by 2 ♂, 2 ♀ (length of body averaging approximately 3.7 mm., male tegmina large and rounded, wings minute) and the second from the last instar by 2 ♂, 2 ♀ (length of body averaging approximately 3.4 mm., male tegmina and wings very small and equally projecting).

Nemobius ambitiosus Scudder. North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.; moderately numerous in debris under low vegetation along borders of live oak groves), 1 ♂, 1 juv. ♂.

Nemobius cubensis cubensis Saussure. Cape Florida, Key Biscayne, III, 12, 1915, (H.; bare muck in red mangrove swamp), 2 ♂, 1 ♀.

These specimens are brachypterous and unusually small for the species. Though very dark in general coloration with limbs much mottled, the female is further unusual in having the exposed portion of the dorsal surface of the abdomen bearing four rows of distinct pale yellowish spots, which marking is the normal condition in the otherwise very distinct *N. carolinus* and its races.

Nemobius carolinus carolinus Scudder. Miami Beach, III, 12, 1915, (H.; only Orthoptera seen after long continued search in red mangrove swamp, on bare muck under roots), 1 ♂,

[16] Ent. News, XXVI, p. 195. (1915.)

1 ♀. Virginia Key, III, 11 and 15, 1915, (H.; locally common in dense red mangrove swamp on sodden leaves under a labyrinth of roots), 10 ♂, 7 ♀, 7 juv. ♂, 8 juv. ♀. Cape Florida, Key Biscayne, III, 12, 1915, (H.; only specimens seen on bare muck of red mangrove swamp), 1 ♀, 1 juv. ♀.

This series is exceptionally dark in general coloration, showing the response to the black muck environment of the red mangrove swamps. In the females, the abdominal color pattern, usually so distinct, has reached the maximum of recession we have observed in this race, the pale spots being wholly obscured and so reduced that only traces of them may be detected with a hand lens. As a result these specimens bear a close superficial resemblance to typical *N. cubensis cubensis,* from which species they are not only separated by several very important characters but also may be further distinguished by the paler and more unicolorous limbs and from the normal condition of that race by the maxillary palpi which in *carolinus* have a great portion of the terminal and penultimate joints very pale. All of the specimens are brachypterous but one of the females from Virginia Key has elongate tegmina. The specimens from Miami Beach are large, the other adults are unusually small excepting two males from Virginia Key which are of medium size. Though abundant locally at Virginia Key, individuals were found to be exceedingly active and difficult to capture, much more so than *Hygronemobius alleni,*[17] but considerable efforts were made to secure a large series owing to the evidently abnormal coloration of the insects.

Anurogryllus muticus (De Geer). Brickell's Hammock, Miami, III, 5 to 15, 1915, (H.; trapped, molasses jar), 1 large juv. ♂.

This species is here recorded from a definite locality in Florida for the first time.

Gryllus assimilis (Fabricius). Musa Isle, III, 4, 1915, (H.; under board in pen), 1 ♂.

This specimen is macropterous and represents the *pennsylvanicus* variant of the species.

[17] This more tropical form may, however, be more decidedly affected by cold weather such as was experienced at the time these specimens were taken.

Gryllodes sigillatus (Walker). The characteristic, very rapid, stridulation of this species was heard in buildings both at Miami Beach and Miami, but no efforts were made to capture specimens.

Anaxipha scia[18] new species (Pl. XX, figs. 3A-3D).

Closely related to *A. vittata*,[19] differing in the uniform dark coloration, proportionately longer and more attenuate limbs and spines of the caudal femora. The tegminal cross-veinlets of the female are also more distinct than in that species or in the closely related *A. pulicaria*.

TYPE: ♀; red mangrove swamp on edge of Brickell's Hammock, Miami, Florida, March 16, 1915. (Hebard; among roots above black muck, sodden leaves and tidal litter.) [Hebard Collection, Type No. 404.]

Description of Type. Size small, form rather slender for the genus (similar to that of *vittata* but with limbs proportionately longer). Head, pronotum and ovipositor as in *vittata*. Limbs more elongate and proportionately more slender than in that species. Caudal tibiae with dorsal margins supplied with three pairs of long alternating spines which are all distinctly longer than the spaces intervening between their bases. Distal extremity of caudal femora supplied with three small external and two decidedly larger internal spurs; of the external three the dorsal is so small that it can scarcely be detected with a hand lens, while the median is the longest and about half as long as the ventro-internal, which is about three-fifths as long as the dorso-internal spur (in these characters agreeing with *vittatus* but with tarsi longer). Caudal metatarsus elongate, one and one-quarter times as long as the longest tibial spur and equalling in length the longest tibial spine. Tegmina much as in *vittata* but with cross-veinlets few but distinct; wings not apparent. Coloration distinctive.

Allotype: ♂; same data as type excepting date, March 15, 1915.

Description of Allotype. Agrees with type in all characters common to both sexes. Tegmina similar to those of *vittata* and *pulicaria*.

Measurements (in millimeters)

	Length of body	Length of pronotum	Caudal width of pronot.	Length of tegmen	Length of caudal femur	Width of cau. fem.	Length of caudal tibia	Length of caudal metatarsus
Allotype, ♂	5.2	1.1	1.7	4.5	4.7	1.3	4.3	1.
TYPE, ♀	5.2	1.1	1.6	3.8	4.7	1.2	4.4	1.

[18] From σκιά = a shadow. In reference to the dark habitat of this obscure species.

[19] In regard to the generic status of this species, see a full discussion in a forthcoming paper by Rehn and Hebard.

The width of the dorsal field of the male tegmen is 2 mm.; in the female the ovipositor length is 2.7 mm.

Coloration. Identical in both sexes. General coloration of head and pronotum sepia, the ventral portion of the interantennal protuberance marked with a narrow perpendicular median line of a paler shade (Saccardos umber). Antennae, maxillary palpi, tegmina and limbs Saccardos umber, the caudal tibiae mottled on the dorso-external two-thirds with sepia and a small but distinct spot of the same color disto-dorsad on the internal face at the termination of the swollen proximal portion of the limb. Immature individuals before us are similar but have a more distinct color pattern with a narrow medio-longitudinal and broad postocular pale parallel bars on head and pronotum and with the face pale, showing in sepia the normal color pattern found in the allied species of the genus as well.

In addition to the type and allotype, we have an immature pair before us taken in the same place and on the same dates.

This species was found to be exceedingly scarce in a heavy red mangrove swamp, where individuals were located among the roots of these trees in places which at high tide were more than a foot under water. In such dark situations, where no green thing was to be seen, these sombre little insects were found to be so active in their movements that another adult seen was lost while the adult pair secured was taken only through rare good fortune.

Anaxipha imitator (Saussure).[20] (Pl. XX, figs. 4A-4D).

Edge of Brickell's Hammock, Miami, III, 15 and 16, 1915, (H.), 41 ♂, 27 ♀, 3 juv. ♂, 8 juv. ♀, several instars represented.

This species, hitherto known only from Cuba, was found abundantly in the narrow border of sloping ground between the jungle of Brickell's Hammock and the red mangrove swamp. There, on the ground among a litter of the dried leaves of a species of wild coffee, *Psychotria nudata,* individuals were found jumping and flying nimbly about. The insects never flew more than a foot or two from the ground, in flight suggesting numerous species of small tropical roaches. The species appeared to be absolutely limited to this very narrow area which would explain its not being previously known from this region. Immature individuals in all stages and adults were found in about equal numbers. At 11 A. M. on a cloudy

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[20] See footnote 19 in re the genera *Anaxipha* and *Cyrtoxipha,* in which latter genus the present species was placed by Saussure.

day with temperature 70°, the few specimens heard stridulating emitted a trilling note, not loud but penetrating; the trills lasting one or one and one-half but occasionally two seconds, with the normal interval between a little less than one second. This song was not nearly as tinkling as that of *Cyrtoxipha gundlachi,* but still pleasant to the ear. Specimens were easily taken owing to the fact that, even if perfectly concealed, they could be easily made to leave their hiding places by stirring about the dead leaves.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of wing	Length of caudal femur
♂........	5.3-6.2	.9-1.1	5-5.4	7.7-8.6	4.7-5.
♀........	4.7-5.4	.8-1.1	4.4-4.7	7.4-7.8	4.3-4.7

This species is closely related to the tropical American species *toltecus* and *angusticollis* and is a member of a large group of species of the genus, no other of which is known from the United States.

The most striking features of the species are: the broad lateral bands of dark brown which run from the postocular portion of the head across the lateral lobes of the pronotum and include all of the lateral fields of the tegmina and exposed portions of the wings when at rest; the very long wings in both sexes and very ample tegmina in the male; the short and widely separated spines of the caudal tibiae; the long caudal metatarsus and proportionately very short distal tarsal joints, and the maxillary palpi which have the terminal joint expanding weakly in the proximal half, but strongly in the remaining distal portion.

Cyrtoxipha gundlachi Saussure. Brickell's Hammock, Miami, III, 4 and 5, 1915, (H.; song heard on all sides after dusk, specimens beaten from foliage), 1 ♂, 2 juv. ♂, 1 minute juv. Virginia Key, III, 11, 1915, (H.; heard everywhere through red mangroves and in strand shrubbery, beaten from bushy scrub near strand), 1 ♂, 1 juv. ♀. Cape Florida, Key Biscayne, III, 12, 1915, (heard abundantly in red mangrove and other heavy leaved trees), none taken.

The very pleasant tinkling song of this species is to be heard almost everywhere on warm evenings about Miami.

Hapithus agitator quadratus Scudder. Brickell's Hammock, Miami, III, 3, 4 and 5, 1915, (H.; adults scarce, immature individuals common in luxuriant undergrowth), 3 ♂, 2 ♀, 3 juv. ♂. Virginia Key, III, 15, 1915, (H.; in red mangrove swamp, on sodden leaves among roots), 1 ♀, 1 juv. ♀.

Orocharis saltator Uhler. Fort Capron (Viking), V, 4, 1 ♂, [U. S. N. M.]. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; under bark of live oak in pine woods), 1 ♀. Brickell's Hammock, Miami, III, 4, 1915, (H.; under bark of tree), 1 juv. ♀.

The present species was not previously known from south of Thomasville, Georgia, from which locality it was recorded as *O. gryllodes*. All previous records of *O. gryllodes* from the United States apply to this species.[21]

Orocharis gryllodes (Pallas).

1772. *Gryllus gryllodes* Pallas, Spicil. Zool., Vol. I, fasc. IX, p. 16, Pl. 1, fig. 10. [♂, Jamaica.]

1844. *Platydactylus saulcyi* Guerin, Iconogr. Règne Anim., Ins., p. 330. [♀, Martinique.]

Unfortunately this distinctive West Indian species has been generally recognized as *O. saulcyi,* which name is an absolute synonym of *gryllodes* of Pallas. Not only does a series of Jamaican material before us bear this out, but the original description and figure show conclusively that Pallas' species was not the insect which Saussure determined as *gryllodes*. Saussure's material from the United States and subsequent records of *gryllodes* from this country have all applied to *O. saltator* Uhler.

Fort Capron (Viking), IV, 15, [U. S. N. M.]. Miami, III, 4, 1915, (H.; small colonies in shrubbery and also in trees about hotels, taken at night), 1 ♂, 2 ♀. Brickell's Hammock, Miami, III, 3, 4 and 15, 1915, (H.; under bark of *Exothea paniculata* and *Coccolobis laurifolia*), 3 ♂, 5 ♀, 2 juv. ♂, 2 juv. ♀; 3 very small juv. (these latter beaten from low vegetation in openings of jungle).

The song of this insect was, next to that of *Cyrtoxipha gundlachi,* the most frequent sound heard on warm evenings. The note is resonant, bă̆ă̆ă̆ă̆ă′, repeated incessantly at irregular intervals of a few seconds. When singing, the males were found perched upon the leaves of heavy bushes with tegmina raised high above their backs; considerable difficulty was experienced in locating individual singers.

Tafalisca lurida Walker. Brickell's Hammock, Miami, III, 3, 1915, (H.; beaten from luxuriant undergrowth), 1 small juv.

[21] This species will be fully discussed in a forthcoming paper by Rehn and Hebard.

EXPLANATION OF PLATE XX.

Fig. 3A. *Anaxipha scia* new species. Miami, Fla. Male (*allotype*). Dorsal outline. (X4).

Fig. 3B. *Anaxipha scia* new species. Miami, Fla. Female (TYPE). outline. (X4).

Fig. 3C. The same. Lateral outline of caudal limb, internal. (Greatly enlarged.)

Fig. 3D. The same. Lateral outline of ovipositor. (Greatly enlarged.)

Fig. 4A. *Anaxipha imitator* (Saussure). Miami, Fla. Male. Dorsal outline. (X4).

Fig. 4B. *Anaxipha imitator* (Saussure). Miami, Fla. Female. Dorsal outline. (X4).

Fig. 4C. The same. Lateral outline of caudal limb, internal. (Greatly enlarged.)

Fig. 4D. The same. Lateral outline of ovipositor. (Greatly enlarged.)

The Number of Generations per Year of the Mud-Daubers (Hymen.).

By PHIL RAU, St. Louis, Mo.

The two species of the mud-daubing wasps, *Sceliphron* (*Pelopoeus*) *caementarium* and *Chalybion coeruleum* certainly have two generations a year and perhaps three.

If we gather the nests during the winter, the young under natural conditions, never emerge before May or June. They hibernate in the prepupal stage, and while their life cycle is long, from September or even August, until June, they pass through the same development as the summer brood. There is no apparent difference between the adults that have gone through the long and the short periods of development. We have never found any of these insects hibernating as adults, nor have we ever seen an adult after the first of October.

August is usually the dividing line of the year. Nests taken in the early part of August give forth their adults in the same or in the following month; those taken in the latter part of the month give forth their adults the next year in May or June. The table below is compiled from notes on nests taken at this critical period:

Sceliphron caementarium.

Nest taken.	Date of emergence.	No. of insects.
August 11, 1910.	August 18, 1910	1
August —, 1910.	September, 1910	2
August 21, 1911.	June, 1912	3
August 21, 1911.	June, 1912	3
August 21, 1911.	June, 1912	1
August 21, 1911.	June, 1912	2
August 21, 1911.	June, 1912	9
August 21, 1911.	June, 1912	5
August 21, 1911.	June, 1912	1
August 21, 1911.	June, 1912	1
August 21, 1911.	June, 1912	2
August 21, 1911.	June, 1912	3
August 20, 1909.	June 22, 1910	2
August 23, 1911.	June, 1912	1
August 21, 1911.	June 20, 22, 1912	2
August 21, 1911.	June 22-28, 1912	3
August 21, 1911.	June 24, 1912	1
September 10, 1911.	June, 1912	5
September 10, 1911.	June, 1912	3

Chalybion coeruleum.

August 21, 1911.	June, 1912	4
August 21, 1911.	June, 1912	1

This is evidence sufficient to show that about August 21, or a little before (since the above dates are when the nests were taken and not when constructed), is the date when eggs then deposited are destined to give adults in the spring. We are sure that temperature is an important factor controlling the time of hibernation, since cocoons removed from the nests in January and kept in the living room gave forth their adults in March.

It would be interesting to find whether it is possible to get the winter brood (that is the eggs deposited in August or September) to emerge in September or October by placing them in an incubator. Those which normally emerge in August or September must necessarily be destined to short lives and probably have insufficient longevity to build and oviposit completely.

A problem of equal inerest in this connection is whether the insects of the first generation carry a greater number of eggs than those of the last generation, in order that they may utilize the summer to the benefit of the race.

We have found that all of the wasps that hibernate in the cells, emerge in May or June; they begin nesting almost at once.

Hence when wasps emerge in July, we know that they are the second brood. We have the following data on the subject:

Sceliphron caementarium.

Nest taken.	Date of emergence.	No. of insects.
June 21, 1911.	July 13, 1911	1
June 21, 1911.	July 8 to 11, 1911	5
June 19, 1912.	July 5 to 14, 1912	6
July 5, 1910.	July 28 to 31, 1910	4

Chalybion coeruleum.

June 21, 1911.	July, 1911	3
June 21, 1911.	July, 1911	1
June 21, 1911.	July, 1911	1
June 21, 1911.	July 10, 1911	1

The two tables above show that the first summer generation goes through its life cycle in less than a month. Hence one can see no reason why, under the same climatic conditions, we should not have another generation following this, covering the July-August period, and this third generation leave behind them the young which hibernate.

It would be very difficult to solve this problem precisely, since in the latter part of the summer the wasps of all the generations are mingled in their work.

Synonymical Notes (Lep.).

In a paper on New Heterocera by Frank Haimbach, which appeared in the Entomological News, Vol. XXVI, p. 321, 1915, the author has unfortunately created several synonyms of Western species, owing to the fact that some recently published papers by Dr. Dyar and ourselves have been apparently overlooked.

Hymenia kaeberalis Haim. is a synonym of *Ercta desmialis* B. & McD. (Cont. N. Hist. N. Am. Lep. II (6) 225, 1914).

Diathrausta montana Haim. falls before *Diathrausta harlequinalis* Dyar (Insecutor Insc. Menst. I, p. 100, 1913).

Galasa fulvusana Haim. is the same species as *Cordylopeza nigripunctalis*. B. & McD. (Cont. N. Hist. N. Am. Lep. II, (3) p. 134, 1913).

Regarding *Pyrausta huachucalis* Haim. we are in doubt, but as far as can be judged by the figure the species looks suspiciously like a Chrysaugid, *Heliades mulleolella* Hlst., which is in Dr. Dyar's list wrongly placed as a synonym of *Arta statalis* Grt. An examination of the venation should of course at once settle the question as to whether the species is a Chrysaugid or a Pyraustid and we should be glad to hear from Mr. Haimbach on the subject.

Amorbia wenzelana Haim., described from a single ♀ should be transferred to the genus *Platynota*. The species is closely allied to *nigrocervina* Wlshm. and has been standing in the Barnes collection under a manuscript name of Kearfott's; this never having been published, *wenzelana* Haim. will of course replace it.—J. McDunnough, Ph.D., Decatur, Illinois.

ENTOMOLOGICAL NEWS.

PHILADLPHIA, PA., DECEMBER, 1915.

The Financial Status of Scientific Journals.

There are over a hundred journals and proceedings devoted to the publication of research work in America, not one of which pays its expenses on a regular business basis....Indirectly they are now subsidized by the work of contributors and editors supported by endowed or tax-supported institutions and by subscriptions to public libraries.—*Popular Science Monthly*, Vol. 87, p. 311.

ENTOMOLOGICAL NEWS has been conducted for twenty-six years on what we considered a self-supporting basis—that is, the expenses of publication have always been covered by the subscriptions and advertisements—but under the definition given in the *Popular Science Monthly* it may not be considered to be conducted on a business basis.

The only person to receive pay is the printer. To be on a "business basis" the editors, advisory committee and contributors should be paid and the journal should not be sold to any institutions tax-supported or endowed. This appears to be the money age and money is considered necessary for all scientific work. As a matter of fact, money, up to date, has been largely a failure as a factor in the advancement of science, as the great discoveries have been made without its help. On the other hand, an immense amount of poor and useless work has been subsidized by money.

The true advance will be made in spite of every obstacle and it yet remains to be proven that money is not largely a failure as a *sine qua non* in science and natural history.

ENTOMOLOGICAL NEWS then is not on a "business basis" and not likely to be in the near future; yet it manages to do what some of our friends consider excellent work for entomology. —H. S.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Parasite of Bellura obliqua G. and R. (Lep., Dip.)

Many larvae of *Bellura obliqua* have been collected by myself and by other collectors in the vicinity of Newark for many years without finding any trace of parasites. Last winter I collected about forty larvae of this species at Cliffwood, New Jersey, which lies beween South Amboy and Keyport and is about 25 miles from Newark, south on the Raritan Bay. When the larvae were collected they did not show any sign or trace of being parasitized and they kept alive without showing any sign until the middle of May, which is about two weeks longer than any of the larvae which were collected in the vicinity of Newark have ever taken to pupate. On the 17th of May, three dead larvae were found in the cage and on examining them it was noticed that a parasite had done its deadly work. Dead larvae were found every day thereafter until the number reached twenty-nine out of the forty, showing about seventy-five per cent. parasitized.

The larvae of the parasite, which turned out to be *Hypostena tortricis* Coq., eat out the substance of the host until only the skin is left and in some cases eat through a part of the skin. Some leave the host while others pupate within the skin of the dead host.

It seems almost impossible for parasites of this order to reach the larvae of *obliqua* as this species feeds in *Typha* (Cat-tails), but it cannot be a hard task, as so many are attacked, but another peculiarity is that this parasite should be so abundant in one place and unknown in others.—HERMAN H. BREHME, Newark, New Jersey.

Corthylus punctatissimus Zimm. in New Jersey (Col.).

This insect, known as the "Pitted Ambrosia Beetle" and recorded in "Insects of New Jersey" from Eagle Rock and Cape May, was found September 8th, at Somerville, N. J., where it was infesting *Rhododendron maximum*, *Kalmia latifolia* and *Azalea mollis*. The work of the insect is indicated by a yellowing and wilting of the leaves, followed by the complete death of the plant. The dead shoots break off easily near the ground where the insects always work. According to Dr. E. P. Felt, who gives an account of this species in the 29th Report of the State Entomologist of New York, Museum Bull., 175, the beetles enter the side of the stem near the ground. Once inside, numerous horizontal galleries and vertical brood chambers are constructed, which, of course, weaken the stem. In one infested azalea stem collected at Somerville on the above date, fifteen adults and three pupae were found. The operations of the insect appear to be confined mostly to plants growing in shaded situations where there is an abundant mulch, and this was true of the infestation at Somerville. Mr. E. A. Schwarz, who studied the pest in huckleberries, states that the beetles are probably subterranean, appearing only rarely above ground. Other recorded food plants are sugar maple, sassafras, dogwood, hazel, huckleberry, water beech, ironwood, rhododendron. The only remedy is to cut and burn infested stems, taking care that they do not break off at the point of injury and allow some of the beetles to escape.—HARRY B. WEISS, New Brunswick, N. J.

The Entomological Society of America: Announcement of the Ninth Annual Meeting.

The ninth annual meeting of the Entomological Society of America will be held in Columbus, Ohio, Wednesday and Thursday, December 29 and 30, and on Friday morning, December 31, if the number of papers be sufficient to warrant it, in affiliation with the American Association for the Advancement of Science and other societies. Meetings will begin at 2.00 P. M. on Wednesday. The meetings of the American Association of Economic Entomologists will begin Monday afternoon with other meetings on Tuesday and Wednesday and Thursday morning.

The by-laws provide that there shall be held at the annual meeting a technical exhibit of entomological materials and methods. Any photographs, drawings, specimens, novelties, apparatus, or other matter of interest to entomologists will be heartily welcomed. This exhibit will remain open during the entire period of the meetings, for the examination at their leisure, of those interested. The exhibit will be under the charge of the local representative of the Society. Ship packages to Prof. J. S. Hine, Ohio State University, Columbus, O.

The annual business meeting will be held Thursday morning, December 30th, for the reports of the executive committee, the treasurer, the auditing committee, the election of new members, the election of officers, and the transaction of all other business.

The Annual Public Address will be given on Wednesday evening, December 29th, by Dr. C. Gordon Hewitt, Dominion Entomologist. Subject: "A Review of Applied Entomology in the British Empire." The entomologists of Ohio are planning a smoker for the visiting entomologists, which will be held probably immediately after the address.

It is impossible to give any information at this date as to whether reduced fares will be available to Columbus or not. Practically all ticket agents are provided with tariff regulations and can tell whether convention rates are available or not. You should inquire of your ticket agent if reduced rates are available and if the certificate form of ticket is used the following should be noted:

1. Tickets at full fare for the GOING journey may be secured within three days (exclusive of Sunday) prior to and during the first three days of the meeting. The advertised dates of the meeting, A. A. A. S., are December 27, 1915 to January 1, 1916.

2. Present yourself at the railroad station for ticket and certificate at least thirty minutes before departure of the train.

3. Certificates are not kept at all stations. If you inquire at your station you will find out whether certificates and through tickets can be obtained to the place of meeting. If not obtainable at your home

station, the agent will inform you at what station they can be obtained. You can in such case purchase a local ticket thence, and there purchase through ticket and secure certificate to place of meeting. Be sure that when purchasing your going ticket, you request a *certificate. Do not make the mistake of asking for a receipt.*

A fee of 25 cents will be charged at the meeting for validating your certificate. No refund of fare will be made on account of failure to have certificate validated.

The hotel headquarters for the members of the Entomological Society of America will be the Southern Hotel, corner Main & S. High Streets. The prices for rooms only, per day are as follows: single rooms, one person, without bath, \$1.50 and up; with bath, \$1.50 and up.

ALEX. D. MACGILLIVRAY, *Secretary-Treasurer.* VERNON L. KELLOGG, *President.*

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

2—Transactions of the American Entomological Society, Philadelphia. **4**—The Canadian Entomologist. **6**—Journal, New York Entomological Society. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **11**—Annals and Magazine of Natural History, London. **12**—Comptes Rendus, L'Academie des Sciences, Paris. **13**—Comptes Rendus, Societe de Biologie, Paris. **15**—Biologia Centrali-Americana, Zoology, London. **16**—Bulletin, Societe Nationale d'Acclimation de France, Paris. **21**—The Entomologist's Record, London. **22**—Zoologischer Anzeiger, Leipzig. **36**—Transactions, Entomological Society of London. **45**—Deutsche Entomologische Zeitschrift. **74**—Naturwissenschaftliche Wochenschrift, Berlin. **84**—Entomologische Rundschau. **89**—Zoologische Jahrbucher, Jena. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **97**—Zeitschrift fur wissen-

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COLEOPTERA ILLUSTRATA by HOWARD NOTMAN. Vol. I, No. 1, Carabidae, Brooklyn, N. Y., 136 Joralemon Street. Copyrighted 1915 by Howard Notman. All rights reserved. Price one dollar.—This is a pamphlet measuring 7½ x 5⅝ inches, consisting of two pages of text and fifty plates. The first page of text is an alphabetical "Index Vol. I, No. 1" to the 48 genera and sub-genera illustrated in the plates, while the other page is an alphabetical index to 60 species and subspecies represented. Each plate shows a single line-drawing of a dorsal view of one species, below which are the names of genus, species and first describer, the sex, length in millimeters and patria. The species depicted may be learned from an examination of the advertisement published elsewhere in this number of the NEWS; they are all of the Palaearctic region, although one, *Carabus maeander* Fischer, is also quoted as from Hudson's Bay. While the idea of figuring insects is a laudable one, we doubt whether these illustrations will appeal to many students in the United States. For them a more valuable work would be one which illustrated the details of structure on which the generic and specific characters of our North American Coleoptera are founded, selecting for this purpose those species which are not figured in the easily accessible literature. (*Advertisement*).

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(* Indicates *new* genera, species or varieties.)

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